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VOL. XXIV. REGULAR EDITION NO. 665.

ARCHITECTURE

ENGINEERING

DECORATION

CONSTRUCTION

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VIEW OF BATH-ROOM FITTED UP WITH THE

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THE report of the Commission of Inquiry, appointed to examine into the circumstances which led to the fall of the tower of the new Church of the Covenant in Washington, two or three weeks ago, has just been made public. The Commissioners, who are all experts, commend the general design of the tower, in which, as they say, the various pressures and resistances were carefully ascertained and provided for, but condemn the workmanship, and a part of the materials used. The specifications called for rubble foundations, and for dressed-stone facings to the superstructure, backed with rubble, "well bonded," "tied to the ashlar face with galvanized-iron clamps wherever necessary or expedient," and laid in mortar made of "the best Rosendale cement," and a certain proportion of lime and sand. Instead of complying with these requirements, the contractor built the rubble-work mostly of small stones, or rather, as the Commissioners say, of "shapeless chunks and chips," "very badly bonded," tied only at rare intervals to the facing, and laid in mortar which was "practically worthless." The foundation walls were only four inches thicker than those of the superstructure, and built in the same way. The conclusion reached by the Commissioners is that the fall of the tower was caused by the badness of the masonry, and this they lay mainly to the contractor, but think that the architects were at fault in providing in their specifications for the use of any lime whatever in the mortar, for not designing the foundation-walls thicker, and for not having watched the work more closely.

WHAT were the relative proportions of lime and cement specified for the backing we do not learn from the report, but the requirements for the mortar in which the facing was to be laid were that only sufficient lime should be used with the cement "to make the mortar easily workable." Analysis showed that all the mortar, for facing and backing alike, actually contained about one part cement to two parts lime, but it was all of such wretched quality that hardly any two stones in the ruins adhere together, and the mortar is mostly in the condition of sand. Although the Commissioners make some judicious remarks about the mortar, calling attention particularly to the fact, which is not always remembered by architects, and is still less frequently thought of by builders, that the mortar "is the great dependence for strength in rubble masonry," we are unable to agree entirely with them that no lime ought to have been used in the work. The mortar for the church appears to have been made with bad lime and worse cement, and we all know that some Rosendale cement is so very bad that, as the Commissioners say in this case, its use adds nothing to the strength of the mortar; but with good Rosendale cement, and good lime, we have General Gillmore's high authority for saying that "the addition of lime to the cement, up to a proportion of equal parts of lime and cement, does not materially injure the mortar;" while, with any quick-setting Rosendale cement, in the climate of Washington in summer, it would, we should say, be often necessary to add lime to the cement to prevent it from setting in the tubs before it could be used. As to the foundation-walls, the Commissioners say that they would have been sufficient, if laid according to the specifications, but they think that the architects ought to have presumed that the contractor would not keep his promises, and to have provided a wider "margin of safety" by making them thicker.

AT the end of the report, the Commissioners say that it appears that "largely for want of the intelligent supervision required of the architects, the contractor's materials and workmanship were inferior and unsuitable," and that "therefore the beautiful tower fell," and they say elsewhere that the "deplorable results were due in a great measure to an entire absence of any continuous personal direction, supervision or inspection by the architects or their representatives, other than some occasional visits, for a few hours or a day each, at intervals of some six weeks;" yet in almost their closing sentence they say that "in form and dimensions the tower furnishes a thoroughly substantial and permanent structure, needing but the simplest kind of good materials and workmanship for its proper erection." These two sentences illustrate with unusual force the standing controversy between architects on one side, and builders and owners on the other, in this country, which is every day becoming more serious for our profession. To take what architects consider to be the obvious view of the case, the report states that the architects of the church did the work they engaged to do thoroughly, skilfully and conscientiously; while the contractor deliberately broke his solemn promises, and slurred and neglected his work until the tower fell down, yet the Commissioners leave him gleefully slapping his pockets, in which he has safe the money which he gained by not doing what he was paid to do, and say that they think the "deplorable results" of his performances are "largely due" to the architects, every one of whose wise and skilful directions he intentionally disobeyed. Most architects, we are sure, regard conclusions of this kind as monstrous, and consider it too obvious for argument that the person to blame for not doing what he promised to do is the person himself; and that the individual who ought to restore stolen goods is the one who stole them; yet in building matters the great mass of mankind think with the Commissioners that if a contractor succeeds in pocketing as profit half the amount of his contract by the simple process of not doing what he agreed to do, it is the architect, not he, who is to blame. The ordinary sentiment is in this case well expressed by an editorial note in the Washington *Star*, which says that "in the mind of intelligent and disinterested persons there can scarcely exist a doubt that the architect is the one who must, primarily and finally, be held accountable, both morally and legally." In other words, according to our interpretation of his remarks, the editor of the *Star* thinks that the man who was paid for building the tower properly, and did not do it, ought to be allowed to keep the money, while the man who prepared good and skilful plans and specifications for it is the one who ought to make good the damage incurred because his specifications were not followed. That the architect was paid a small sum for "general supervision" of the work does not, in the professional mind, alter the case at all, for the reason that he knows that it is absolutely impossible for any architect, in the visits of supervision usually made, to detect a hundredth part of the contractor's omissions and mistakes, any one of which may prove fatal to the building, and he cannot conceive that any sane man should expect him to do so; but, on the other hand, the public generally assumes that by paying the architect a tiny fee he becomes individually responsible for all the contractor's work, and can be called upon at any

time to make good the contractor's omissions, at his own expense.

So far as this country is concerned, the latter idea is altogether too well founded for the good of our profession. Although, if an architect exercises "due diligence" in supervising work under his charge, he is exonerated from liability on account of the contractor's failure to follow the specifications, it is far otherwise if he is found to have neglected that "due diligence" which a jury may find to have been required under the circumstances. In that case, although the contractor is clearly the person at fault, the law in this country is that the owner may, if he chooses, recover damages in full from the architect, leaving the latter to get reimbursement from the contractor, the real person at fault, if he can. If there were any standard of the due diligence required of the architect, it might be possible to arrange a *modus vivendi* between the architect and the owner which should provide a mutual understanding and complete security for both, but there is in this country nothing of the kind, and American architects are in constant danger of being ruined by any vicious client who may choose to accuse them of being the cause of his disputes with his contractors. It is quite time that this danger, which presses upon responsible architects with a rigor unknown in any other profession, should be removed, and it might easily be so. In all other civilized countries the architect is presumed to need most of his time for designing or directing in his office, and a clerk-of-works, or "*inspecteur des travaux*," is always provided, at the expense of his client, to watch the workmen from day to day, see to the mortar-mixing, report to the architect, and, in general, to do just what would have served, in the case of the Washington church, to detect the bad work in time to have it pulled down and done over again. Here, on the contrary, most architects are their own clerks-of-works, and are compelled in consequence to devote themselves, for fear of the terrible penalties which may punish a few days absence, to unremitting toil, while their more fortunate neighbors, the doctors, lawyers and merchants, are enjoying vacations all about them. Occasionally an architect is found who refuses to submit to such a burden. The late Mr. Richardson generally demanded, and received, two and one-half per cent in addition to the regular five per cent on the cost of the building, in cases where his clients wished for more careful supervision than that which would be given in a monthly or bi-monthly visit; and it is not very unusual in the large cities for architects to call upon their clients to furnish clerks-of-works, to keep up the minute daily supervision which they do not consider it their own duty to furnish. There is no question that they are right. It is for no one's real advantage that the architect, the planner, the designer, and the deviser of methods of construction, should be compelled to waste his time day after day in seeing mortar mixed, or bricks laid, so as to be sure of the exact quality of the work, nor can any architect pay half his commission to some one to do it for him. If architects are to be bound to supervision of this sort, they must be paid for it; if not, it must be generally understood that their clients, if they desire it, must furnish it themselves. There ought to be no great difficulty in getting this understood, and acquiesced in, by the public, and it would not be, perhaps, too soon for the Conventions of October and November to take up the subject.

We suppose that the American Public Health Association wishes for nothing more earnestly than as full a discussion as possible of the subjects to which it gives its attention, and we therefore make no apology for commenting, and inviting comments from other people upon certain matters which we find in its prize essay upon "Building a Home," by Professor Vaughan of Michigan University. After some very judicious remarks on soil and situation, Professor Vaughan gives a chapter on Cellars, which is too brief to contain all the exceptions to its rules that might with advantage be noted. The first rule is that all cellar walls ought to be "air and water tight," and this quality is to be secured by filling in a foot of "gravel or clay" all around them. If the foundation-walls are of brick, a "thin outer wall" is to be built, "two or three inches from the main wall, and the floor is in all cases to be made of concrete about six inches thick covered with Portland cement or asphalt." That such a construction will be expensive, Professor Vaughan admits, but he thinks that it should be insisted upon, "even if it becomes necessary, on account of increased cost, to deprive the superstructure of some of its ornamentation." How many jig-sawed brackets it would be necessary to dispense with in the cornice to pay for such a cellar as his essay demands, Professor Vaughan does not say, and we doubt whether he has made an accurate estimate of them. If he had done so, it is hardly likely that he would have seriously proposed a structure of that sort as the only one suitable for the dwelling of persons of the class to which the essay is addressed.

In regard to the "perfectly water and air tight" cellar walls we suppose that the recommendation of the essay is intended to be taken with a liberal allowance, the cost of a cellar wall really water-tight, enclosing a given area, being not much less than that of an ordinary complete house covering the same area. Regarding this, however, as meaning simply that the wall should be laid in cement mortar, without more than the usual proportion of void spaces, we next meet, in the recommendation that a space of a foot around the walls should be filled "with gravel or clay," a self-contradictory rule, which needs explanation. It is hardly necessary for architects to point out that gravel and clay, as filling materials, are of opposite nature, and that where gravel filling is useful clay is objectionable, and *vice versa*, but the essay tells us nothing of the way in which the kind best suited to the circumstances can be selected, nor of the importance, in case cellar walls in clayey or marly ground are surrounded with gravel, of providing an outfall below the level of the cellar floor for the water which will collect in the gravelly envelope. Without this, the porous mass will fill, after heavy rains, with water, which, hemmed in by the impervious earth outside, can escape only into the cellar, and usually does so, while a clay filling, although it protects the walls against moisture coming from beyond, is itself generally cold and wet, and keeps the adjoining stonework damp. Our own idea is that a filling of gravel or cinders is always to be preferred, on the condition, however, that unless the soil beyond it is very porous, the water which runs in stormy weather down the sides of the house, and sinks into the gravel, shall be received, below the level of the cellar bottom, into a pipe or stone drain large enough to carry it off rapidly to some proper outfall. Under this arrangement the air circulates outside the cellar walls as well as inside, to their great advantage. Of the more artificial method of promoting dryness, by building a thin screen-wall of brick outside the main foundation, we must confess to having a poor opinion. Unless defended by a filling of gravel or cinders, well drained, so that water could not collect in it, such a screen-wall would, in the climate of our Northern States, be torn to pieces after a few winters, while in any climate and under any circumstances it is liable to be crushed by the pressure of earth against it, and to allow water standing in the ground outside of it to come through and fill the air-space between it and the main wall. If, however, Professor Vaughan's ideal of a cellar wall is ill adapted to the use of modest householders, his model of a cellar floor is hardly better. While six inches of concrete is well enough for the floor of a costly building, three inches of good concrete on a suitable foundation gives a floor sufficiently hard for any ordinary dwelling-house and nearly as impervious to ground air as a six-inch stratum. Neither is, however, entirely impervious, and nothing but asphalt will make it so, but the cost of this, amounting to about two hundred dollars for a small house, is so great as to make it practically unavailable. In fact, the equipment of a cellar with six-inch concrete floor, with asphalt over it, and screen-walls outside, would add from five hundred to a thousand dollars to the cost of the house, without any great corresponding advantage. In regard to keeping ground air out of the cellar, a three-inch floor of concrete without asphalt will repel air better than an ordinary stone wall, and there seems to us to be little use in asphalting the floor unless the walls are also made air-proof by "boxing," or lining with asphalt at an immense expense. A good deal may be done cheaply to make the side walls of the cellar air-tight by painting them on the outside with hot coal-tar, and in certain cities, where the ground is polluted by cesspools, this is very useful, but the most reliable of all devices is to have the cellar windows large and keep them open, and if this is faithfully done and water prevented by proper drains from ever entering the cellar, as much has been accomplished as can be hoped for in the basements of workingmen's dwellings.

BUILDERS' HARDWARE.[1] — VII.

HINGES. — HASPS AND STAPLES.

Fig. 59. Hasp and Staples.

WROUGHT-IRON hasps and staples are not properly to be classed with hinges, but it seems convenient to introduce them at this point. Ordinary wrought-iron staples are made in thirteen sizes, from one inch to six inches long. They are made both in plain and galvanized iron and are used in building operations chiefly in connection with wrought-iron hasps. Figure 59 shows the commonest form, a plain hasp with two staples. Hasps are made in even inches from five to twelve inches in length. A variation from the common hasp has a latch on the hasp which catches into one of the staples in place of a padlock, as shown by Figure 60. A natural simplification of this devise is to do away with the hasp, connecting the staples by a wrought-iron hook, the staples being either driven independently, as in the previous examples, or riveted to plates, as shown by Figure 61. There is also a form of hasp and staple intended to be secured with a padlock, the locking-staple being swivelled on a back-plate which is screwed to the jamb.

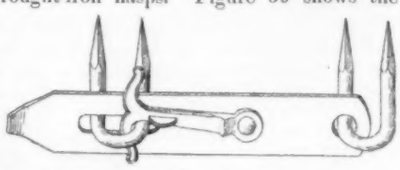


Fig. 60. Hasp and Staple with Double Hook.

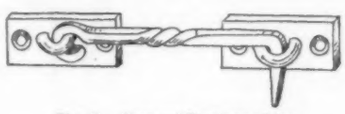


Fig. 61. Hasp and Staple on plates.

In place of the ordinary wrought-iron hasp and staple, Figure 59, hasps are made bent at right angles at the middle so as to lap around the edge of a box or a door, if necessary. Bent hasps

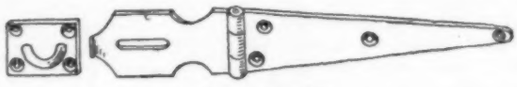


Fig. 62. Hinged Hasp.

can be had in the market from five to ten inches in length. Besides this, there are numerous special forms which are made by a few manufacturers, and as hasps are always of wrought iron or steel, they can be bent to any desired shape.

The connection between hasps and hinges can be readily illustrated by Figure 62, representing a hinged hasp. This is a natural outcome from the common hasp and staple, the hasp being hinged in the middle, one end screwed onto the door or box-top, while the other end has a slot through which is passed a staple for securing the padlock. The figure shows one of these, with an ordinary staple attached to a wall-plate. They are also manufactured with swivelled staples. These hinged hasps are made three, four and-one-half, six, eight, ten and

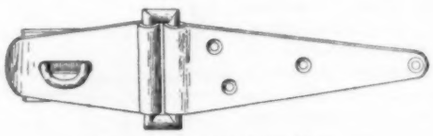


Fig. 63. Solid Link Hinged Hasp.

twelve inches long. The price is the same for either the plain or the swivelled staples. Some manufacturers have in the market varieties of hinged hasps made in brass or bronze for fancy work. These are, however, not used very extensively, and the form is more strictly for rough work.

A form of hinge-hasp shown by Figure 63 is sometimes used for extra-heavy work, and for trap-doors. In this, the hasp works upon a solid link of wrought-iron, and considerable gain of strength is so acquired.

STRAP-HINGES.

Hinges, proper, may be divided into two general classes: First, those which are placed on the face of a door or shutter, and are known as strap-hinges; and second, those which are mortised into the butt edge of the door and against the frame, and are, consequently, designated as butts. Figure 64 shows the commonest form of a strap-hinge, such as is seen on barn-doors, etc. These hinges are made in even sizes from three to sixteen inches long, measured when opened flat. They are

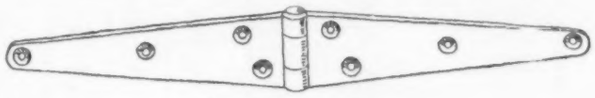


Fig. 64. Strap-Hinge.

made in various ways and widths to suit special necessities. A variety of strap-hinge is made by the Stanley Works, with the same sort of solid link that has been described for Figure 63. This form of hinge can be used only where there is plenty of room both on the door and on the jamb for attaching the leaves

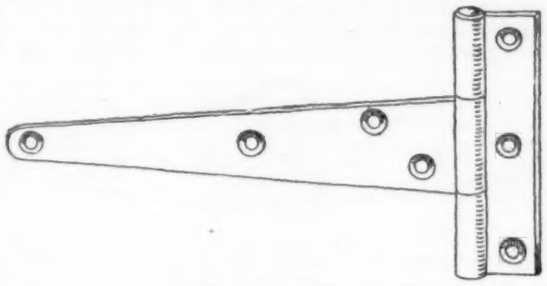


Fig. 65. T-hinge.

of the hinges. When the width on the jamb is restricted, as is often the case, a T-hinge, Figure 65, is used. In some cases it is necessary to have the fixed plate bent, a form known as the chest-hinge being then used, Figure 66. The latter costs considerably more than the common form. The T-hinges are

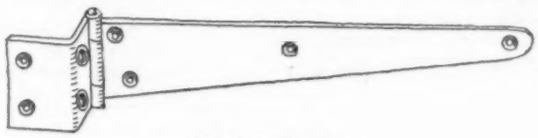


Fig. 66. Chest-Hinge.

about the same price as the ordinary strap-hinge. The Stanley Works manufactures a T-hinge with a braced leaf, which is very useful in some cases. This is shown by Figure 67.

There are several special makes of strap and T hinges, which are reinforced so as to afford greater strength. One of

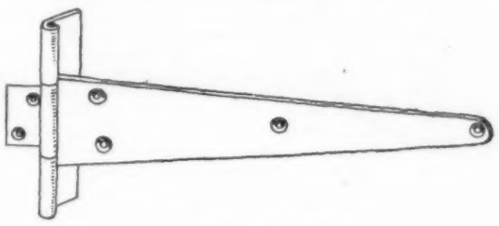


Fig. 67. T-hinge with braced Leaf.

these is the Wells patent hinge, Figure 68, in which the metal of each leaf of the hinge is carried completely around the bend and back onto itself, so that it would be almost impossible to tear it away. The Hart patent hinge is reinforced by a double thickness of metal about the pin, and the Record hinge is strengthened by two flange-plates, which are bolted to each leaf and attached to the pin, as shown by Figure 69. The prices of these reinforced hinges are the same for the different kinds.

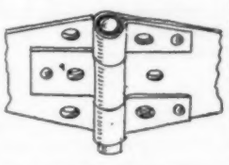


Fig. 68. Wells Patent Hinge.

Figure 70 shows a hinge which is used when it is desired that the pin should be well out from the door or shutter, so as to throw it open away from the jamb. This hinge is made in sizes from six to eighteen inches long.

The following table gives the average retail prices of the foregoing hinges, in a few of the leading sizes.

[1] Continued from No. 664, page 120.

TABLE OF WROUGHT-STEEL STRAP-HINGES.

Prices per dozen pairs.

Fig.	Name.	3 inch.	6 inch.	10 inch.	12 inch.	16 inch.
		$	$	$	$	$
59	Hasp and staple	.....	.55	1.00	1.53	.....
60	Hasp and staple with double hook	.....	.56	1.00	1.54	.....
61	Hook and staples on plate[1]	1.20	.....	.....	.....	.....
	Hasp and staple with swivel staple	.....	.91	1.54	.....	.....
62	Hinged hasp	.96	1.24	2.61	3.85	.....
63	Solid-link hinged hasp	.....	8 inch.[3]	.....	.....	.....
64	Strap-hinge[2]	.50	1.35	1.75	3.00	4.50
65	T-hinge	.50	.75	1.20	1.88	.....
66	Chest-hinge	.....	.88	1.25	1.50	.....
67	T-hinge with braced leaf	.....	.....	1.79	2.75	.....
68	Wells's patent hinge	.....	2.10	4.95	7.05	.....
	Hart's patent hinge	.....	2.10	4.95	7.05	.....
69	Record's patent hinge	.....	2.10	4.95	7.05	.....
70	Raised strap-hinge	.....	.....	2.63	2.95	4.25

[1] These are made as small as ½ inch.
[2] Prices given are for light strap-hinges. Heavy strap-hinges are sold by the pound at 12 to 14 cents.
[3] $6.60.

Figure 71 shows a special form of hinge manufactured for trap-doors, permitting the door to be hung from the under side, leaving the upper side free from obstruction, and flush with the

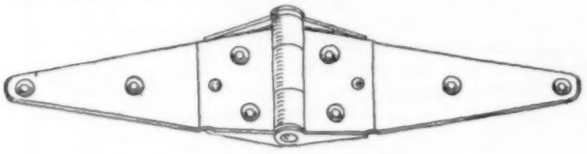


Fig. 69. Record's Patent Hinge.

floor, while at the same time the use of the full size of the trap can be had when the door is up: the hinges will hold the door in position. The working of this hinge will be seen by the figure. The retail price is $1 per pair. It is listed in the catalogues of several of the hardware manufacturers.

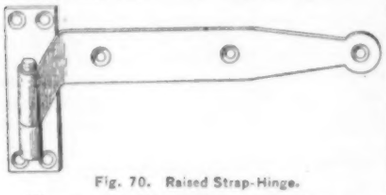


Fig. 70. Raised Strap-Hinge.

Figure 72 illustrates a species of rude hinge used quite

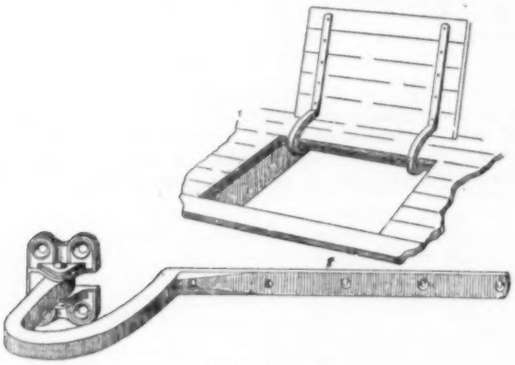


Fig. 71. Trap-door Hinge.

frequently for barn and warehouse doors, consisting of a hook to be driven into the door-post and a bar with an eye at the end to be bolted through the door. These are made of iron ½, ⅝, ¾, ⅞ and one inch thick, and are sold by the pound, and at 25 cents for ½ and ⅝ inch, and 20 cents for the other sizes.

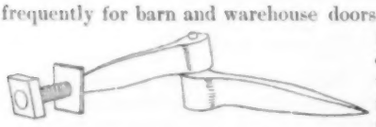


Fig. 72. Barn Door Hook and Eye Hinge.

BLIND-HINGES.

A variety of hinge which may not be called a strap-hinge, but which, nevertheless, partakes of its nature, is manufactured in a great many forms for outside blinds. The practice of hanging blinds differ in different parts of the country. In the vicinity of Boston the blinds are generally hung on the outside of the casing, and the hinges consist of a simple half hinge on the blind and a hook driven into the face of the casing. In New York the blinds are, almost invariably, set flush with the outside casing, requiring a different style of hinge. Throughout the West a number of forms of cast-iron hinges are used, which, in a measure, lock the blind when open or shut, as will be hereafter noticed. For blinds hung in the Boston fashion, the commonest way is simply to attach a half hinge to the blind, as previously stated. These half hinges are made in two sizes, two and two-and-one-half inch, costing $5 to $7 per hundred sets. They are mortised into the edge of the blind. If additional strength is required, a longer strap-hinge is used, which is screwed onto the face of the blind. There are various forms of these strap-hinges used for this purpose, all of which are too commonly known to require description. Another variety of the same kind of hinge is made so as to throw the blind well out from the casing and away from the moulding. These are made with a two-inch throw, and others with a four-inch throw are also in the market for use in connection with brick buildings.

For the blinds attached in the New York manner, some of the foregoing forms can be used, if the butts are set out sufficiently to clear the face mouldings of the frame, but generally

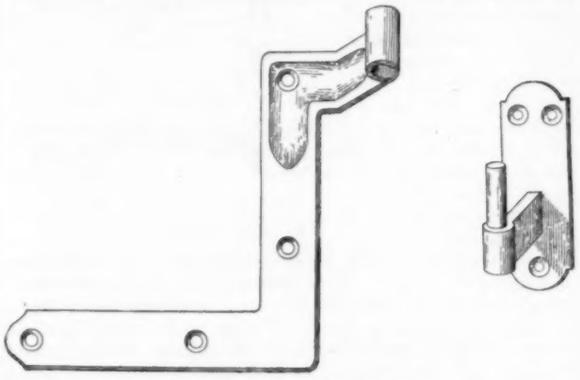


Fig. 73. Blind Hinges, New York Style.

speaking strap-hinges are used, in most cases, of the form shown by Figure 73, the strap, which is bent so as to strengthen the frame of the blind as well as support it, being secured both to the rail and the style. Instead of the hook shown by the figure, some form of drive hook is often used, and the hinge, instead of being bent, sometimes consists of a straight face-plate or strap. Figure 74 is a form of malleable-iron hinge used for blinds hung in the New York style.

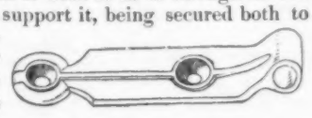


Fig. 74. Malleable Iron Blind Hinge.

The hooks which are used for blinds are mostly made of malleable-iron. There are several varieties. A plain hook to drive into the wood, shown by Figure 75, is made three and a half inches long with a shorter length of the same style for light blinds hung flush with the casing. Figure 76 shows what is designated as a drive brace. Figure 77 is a form sometimes used, an iron screw-hook; and Figure 78 is the most common form of screw brace.

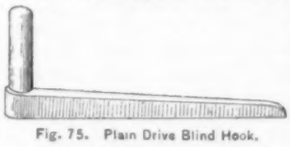


Fig. 75. Plain Drive Blind Hook.

The advantages of the styles of hinges previously described are that they are mostly made of wrought-iron and are not apt to break, while there is absolutely nothing to get out of order about them. The disadvantages are that they contain in themselves no principle which will hold the blind open or shut, and when it is secured in the ordinary way it takes considerable bending and twisting to close the blind after it is opened. To overcome these difficulties a number of forms have been devised, most of which are used more freely in the West than in the East. All of them are arranged to keep the blind from closing itself. They are generally made of malleable-iron, a feature which

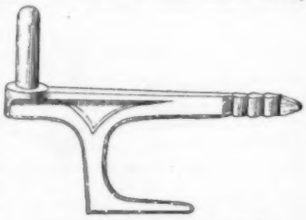


Fig. 76. Drive Brace Blind Hook.

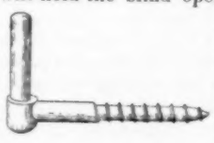


Fig. 77. Screw Blind Hook.

would be an objection in the eyes of Eastern builders. One of the simplest forms is the Seymour hinge manufactured by P. & F. Corbin. Figure 79. The essential principle in this hinge includes a raised cone on the house hinge working into a socket on the blind hinge. The hinge is shown partially raised and in the position it takes when the blind is

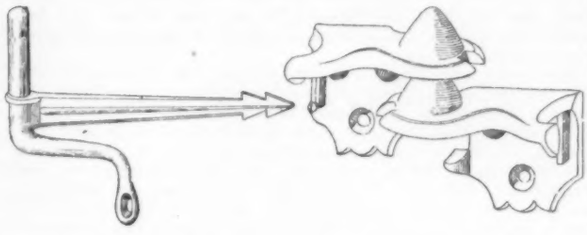


Fig. 78. Screw Brace Blind Hook.

Fig. 79. Seymour's Blind Hinge.

closed. When the blind is thrown back a lip on the upper hinge catches on to a protection on the lower hinge and holds the blind firmly in place, so that it can be released only by raising the blind bodily.

The Shepard Hardware Co., of Buffalo, manufactures a number of varieties of window-blind hinges which are used quite extensively. All of them are double locking and arranged so that the blind can be lifted off the hinge only in one position, thus obviating any upsetting of the blind when trying to close it. Most of the Shepard hinges close by gravity when once raised; that is to say, the surfaces of the upper and lower hinge are bevelled so that the blind will slide down of its own weight and so close. Figure 80 shows one of the best of these hinges and illustrates also the manner in which it closes by

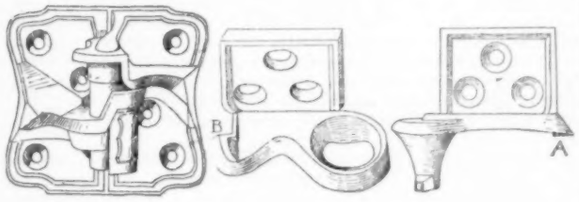


Fig. 80. Shepard's Noiseless Blind Hinge.

Fig. 81. Shepard's Standard Blind Hinge.

gravity. This hinge and nearly all of the Shepard make are planted on the face of the blind rather than mortised into the edges. A very simple form, and one quite good in its way is shown by Figure 81. The two parts of the hinges are shown separately so as to represent it more clearly. The fold on the right is attached to the blind and the hook rests in the socket of the other fold of this hinge. The bottom of the socket is contracted to an ellipse and by reason of the lug on the blind hook, the blind can be lifted off the hinges only when standing at right angles to the house. When the blind is open the lug *A* catches into *B* and hold the blind securely. In order to close the blind it is lifted bodily until the lug clears the catch. Figure 82 is another variety of the Shepard hinge which can be used in case the blind is set on the face of the casing, the two arms of the hinge being unequal in length. All of the Shepard goods are very nicely finished and seem like very durable and serviceable articles. There are many varieties but the foregoing will answer for the purposes of general illustration. They retail at ten cents per set, or fifteen cents with screws.

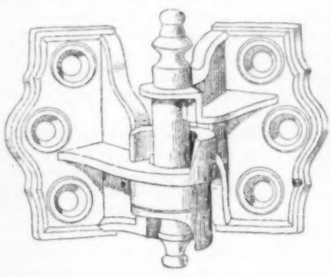
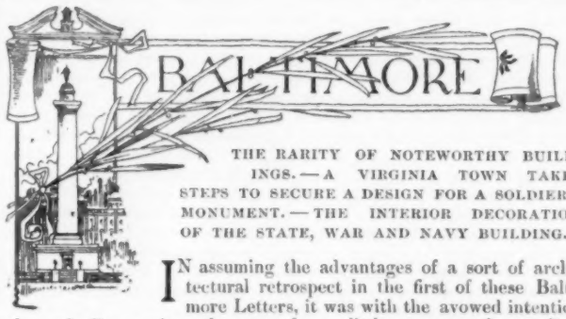


Fig. 82. Shepard's Gravity Blind Hinge.

[To be continued.]



THE RARITY OF NOTEWORTHY BUILDINGS. — A VIRGINIA TOWN TAKES STEPS TO SECURE A DESIGN FOR A SOLDIERS' MONUMENT. — THE INTERIOR DECORATION OF THE STATE, WAR AND NAVY BUILDING.

IN assuming the advantages of a sort of architectural retrospect in the first of these Baltimore Letters, it was with the avowed intention of gradually paving the way for a little more understanding and interest in the buildings of to-day, a looking-back into architectural pedigree, as it were, which has only gone to prove, alas! how and when whatever once existed of the "thoroughbred" has died out, and where the mongrel race came in. And although we also assumed at once the cheerful line of argument, and held desperately on to the thread of it — that we were gradually leading through a dark age to a more hopeful present and future — when we really come to lay our hand on the conspicuous buildings that have been erected in the last few years in other cities as well as in Baltimore, how very few there are, with some noted exceptions (that emanate from not more than half-a-dozen different offices), which, from an architectural point of view, have anything of a national interest, and, however imposing their dimensions may be, offer anything more than a re-arrangement of oft-used forms and decorative detail in an effort after novelty.

Here in Baltimore perhaps we had better frankly confess that this element is very strikingly apparent among noteworthy buildings lately erected or still under construction. We may cite Rennert's Hotel, the Eutaw Savings Bank, the Hutzler building, the Darby building and the Farmers' & Merchants' Bank; but, notwithstanding laudatory local criticism, we fail to find in any of these the character that would make them objects of more than local interest, or place them in the front ranks with the best work that is now being done throughout the country.

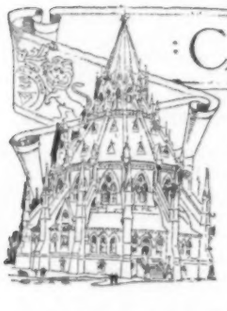
The Mercantile Trust and Deposit Building, from the special purpose for which it was designed, naturally acquired a certain character and interest, and has apparently attracted more than local attention, and its architects would doubtless be content with no further criticism upon it than that of a contemporary French architectural journal, lately translated in the pages of the *American Architect*. When we turn to the consideration of the dwelling-house design we find much the same conditions obtain; much has been rescued from the "vernacular," from the hand of the carpenter and builder, and the half-fledged architect, but, with one or two rare exceptions, nothing has been produced of marked intrinsic merit. The attempt at "Belvedere Terrace" to solve the question of the best arrangement for an eighteen or twenty foot house built in a row, produced the somewhat unusual result of an entire block, from Eager to Chase streets, being solidly built up on both sides, with an effort at a certain harmonious symmetry and balance in the whole length of the street-fronts, the two sides of the street being given to two different architectural firms to design, and the general effect of the whole block is decidedly above the average for houses of such moderate cost and dimensions. While that on the west side, as regards plan and interior arrangement, has met with general approval, and is far the more satisfactory of the two, we do not find that the evidently carefully-studied and somewhat academic design of its façade is any happier than the rather careless and accidental style of its opposite neighbor.

Such conspicuous buildings as the United States Post-Office, now nearly completed, and the great Hopkins Hospital, about to be opened, after a preparation of many years, call for a wider description and criticism in a later letter, so we may close this with a slight digression to an analogous subject that is not without a somewhat pathetically humorous side to it.

The erection and dedication of numerous commemorative monuments on the field of Gettysburg, on the occasion of the great celebration of July 3, suggests a recent incident, that would be amusing if it were not for the discouraging element in it as a typical illustration of the art-feeling in certain communities. A not very distant trans-Potomac town (we will not designate more closely) determining to erect a soldiers' monument within its own borders, and having appropriated some $4,000 for the purpose, applied to a well-known stone-mason in Baltimore for a design, apparently quite ignorant of, or wilfully ignoring the fact that such commissions were ever intrusted to those of more artistic training. The essential feature of the design was to be a full-length figure of a soldier raised upon a pedestal, the whole to be twenty-five feet high. The stone-mason, among the most prominent of his trade in the city, and a man of intelligence, somewhat doubting his power to grapple with the problem, wrote to a young architect in another part of the city asking *if he would kindly come to his stone-yard for about half an hour and give him a drawing* for the monument, and suggested the possibility of his taking the train that night for the purpose of submitting the

completed design to the approval of the impatient trans-Potomac art-patrons. The young architect, while thoroughly appreciating the absurdity of the transaction, did not happen to be in such a position that he was willing to refuse his services, when asked for any legitimate object that would sufficiently renumerate him, and having a certain capacity for effective sketching, by the aid of such models as he could immediately lay his hands upon, he produced a hastily conceived design to an inch scale, which, although he refused to undertake the further commission of bearing it to the art-committee and revealing to them its occult merits, met with unqualified admiration from the stone-mason. It was, however, duly submitted to the committee, and received with a very prudent reserve, non-committal of either approval or disfavor, and their future action has only been vaguely surmised by certain questions to the mason, which seem to suggest that he may only be required to furnish a pedestal for a "metallic" statue from a manufacturer who keeps them in stock. Under what different auspices was undertaken the somewhat analogous scheme of erecting monuments commemorating the battle-fields around Paris, after the Franco-Prussian war, may readily be seen by referring to the pages of "*L'Intime Club*," where are shown the numerous designs submitted for the purpose in competition by many of the leading architects of France; and as regards Gettysburg, we may feel that the probably numerous insults to art, resulting from most of the monuments erected there, are largely compensated for by the gain to the world of thought and literature in Mr. Curtis's grand oration on the occasion. While we are in the spirit of pessimistic criticism we are tempted to refer to a recently published article from a Washington correspondent, headed "An Artistic Building." The following extract is taken from a mass of elaborately detailed description of decoration, which (having some belligerent emblems) would seem to fittingly apply to the Hoffman House restaurant, perhaps, rather than to the State, War and Navy Building of a great nation. In redundant and superlative writing the author fairly rivals Mr. Rider Haggard in his own field of "the Horrible."

"Nearly fifty artists have been busily at work decorating the rooms in the new wing of the State, War and Navy Department Building, which are to be occupied by the Secretary of War, and the higher officers of the army. The result is a series of apartments which for richness of ornamentation cannot be equalled in this country. Nearly every color known to the painter's palette has been brought into requisition, and the designs being all original and appropriate have been prepared with an eye to rich and sumptuous effects. . . . Mr. Endicott's æsthetic Boston tastes will certainly be gratified when he enters these rooms. . . . they are gorgeous chambers. . . . The ceiling itself is almost covered with a wealth of frescoing in gorgeous colors. . . . No words can describe the effect which the highly-colored splendor of these rooms produce (*sic*) upon the visitor. . . . Another room on the same floor is a symphony in purple. . . . A little gem of a room in the third floor; its mantle is of red marble, and the dado is such a perfect imitation of the stone that it is hard to tell where the mantel ends and the painting begins. Thousands of dollars have been spent in beautifying these offices, and when completed each will be an art gallery in itself." Let us hope for the sake of our national art reputation, and also on account of their possibly dangerous influence upon our future war transactions, that these descriptions are not accurate.



CANADA

RELATION OF THE COLONIES TO THE MOTHER COUNTRY. — CANADIAN PACIFIC RAILWAY.—OWEN SOUND.—ST. LAWRENCE RIVER CANALS. — ST. PETER'S ROMAN CATHOLIC CATHEDRAL, MONTREAL. — PLUMBERS' STRIKE. — TORONTO ARCHITECTURAL GUILD, ETC.

A VERY able leader of the London *Standard* of nearly four years ago (December 27, 1884) pointed out how rapidly England was becoming a "Continental nation." England cannot be considered now, as it was in earlier times, "a group of islands, possessing great colonies and dependencies, which were either islands or surrounded, at least, by barbarians, which were easy to repel and only too easy to conquer." After saying that, "obeying the impulse which drove us to the establishment of colonies, not only one power, but all the great powers are rushing outwards from their own dominions in streams either of conquest or colonization which must come in contact with what we have hitherto considered as our natural development," the article goes on to show the result of this movement which is that the English have become next-door neighbors all over the world with one or another of the other powers. In India we have Russia on our very borders. In Austria and at the Cape Colony we find ourselves side by side with Germany. "Even without the question of colonization in Egypt, we are unquestionably face to face with France. She is establishing herself at the mouth of the Red Sea, and she calls all Europe to oppose English designs in Egypt." "If England holds certain detached fortresses in the Mediterranean, France is creeping around the mainland and endeavoring to turn the Southern waters of Europe into a French lake." It is then urged that the standards of both army and navy be raised, and the leader concludes by saying that "what we have to do as a nation is to grasp the idea that the future hope of Great Britain and her colonies lies in a frank acceptance of Imperial Federation established on a firm basis."

Four years have passed away and we see that this is more than ever the fact, and in no part of the empire is there a more important country, strategically, than Canada at this moment.

Recognizing the importance of the position that Canada must take as a portion of this "Continental nation," the Imperial Government though slow to act is setting about the task of preparing her to protect herself. The construction of fortifications, docks and harborage, the development of towns and villages as posts of communication and bases of supply along the line of that railway, which, crossing the Continent direct through British territory, forms such an important link in the chain connecting the mother country with the colonies of Asia and Polynesia — all these works bring men and materials, and the materials must be quarried or manufactured, transported and prepared, and so the country "goes ahead."

It is the gigantic enterprise of the Canadian Pacific Railway which has enhanced the value of Canada in the eyes of England, said the Hon. J. A. Chapleau, in his speech at Montreal (January, 1885). England has learned that Canada is no longer a child, but has reached maturity and can be made use of, and can make herself of use. The completion of the Canadian Pacific Railway has opened up a route by which in a Westerly direction, as well as in an Easterly, we have a highway to the East. Heretofore, the Easterly route, the Suez Canal, has been the only one, and it — a slender one at best, into the bargain, a silver thread on the face of the globe, but too easily snapped — a canal, than which nothing would be easier to obstruct and destroy, but of an importance to England of untold value. And so it has come to pass that a tide of increasing prosperity appears to have set in for Canada. Look where you will, all hands are engaged in the work of development. Strange, if a country of its possibilities should not ultimately be able to hold its own against all comers. The recent fisheries retaliation cry has done one good thing for Canada, it has made us open our eyes to the fact that we can do without the States; we can improve existing means of transit, engineering can overcome most difficulties, and, in fact, it would be rather an advantage to Canada if the threat were carried out. The action would quicken the work of developing the resources of the country.

I have said a good deal about Montreal and Toronto in former letters, but some of the lesser towns deserve remark. At the present moment Owen Sound stands out as an example. This enterprising little town of some 5,500 inhabitants, situated on the south shore of the Georgian Bay, east of Lake Huron, in most picturesque scenery, has long been used as a port, but now it is to become a great business centre. The Government has recently voted $15,000 for improvements (principally dredging works) to the harbor, and a request has been forwarded to the Department of Railways and Canals, that the stone from Owen Sound quarries may be used for the works of the Sault Ste. Marie Canal, another engineering work of great importance. The Grand Trunk Railway passes by Owen Sound at a distance of seventeen miles on one side and fifteen miles on the other, and efforts are being made to induce the Company to connect with the town on both sides, to give outlets in each direction.

Among the engineering works in progress may be mentioned the widening of the canals on the St. Lawrence River, a much needed operation. The result of this will be that when completed there will be a magnificent and unrivalled water-way, despite great difference in levels and the unsurmountable rapids, sufficient for the necessities of traffic for years to come, extending about two thousand five hundred miles: this waterway exists already; it is now to be improved in part.

The railway bridge of the Canadian Pacific Railway over the St. Lawrence River, above Montreal, is just completed, and affords a striking contrast with the "Victoria" bridge, designed and executed by the great English engineer, Robert Stephenson, nearly thirty years ago (1859.) This bridge is constructed on the tubular principle, while the new one is a cantilever.

The Roman Catholics of Montreal are rejoicing over the work of finishing the great Church of St. Peter's. About $300,000 have been spent upon it up to the present, and it is thought $150,000 more will complete the edifice sufficiently for occupation and use. As the diocese consists of 400,000 Catholics, it is thought there will not now be any opposition offered, and that the money will be willingly subscribed. The church is on the model of St. Peter's at Rome; the dome rises to a height of two hundred and sixty feet, and as it stands on the brow of a short but steep hill, it occupies a very conspicuous position from all points of the compass.

The Minister of Education for the Province of Ontario, has a scheme for establishing a "chair of architecture." There seems to be hardly room enough for such an institution, but it is a good thing

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Designs for Church & Chapel, 2nd Ave. & 72 St., N.Y.

R.H Robertson, Architect.

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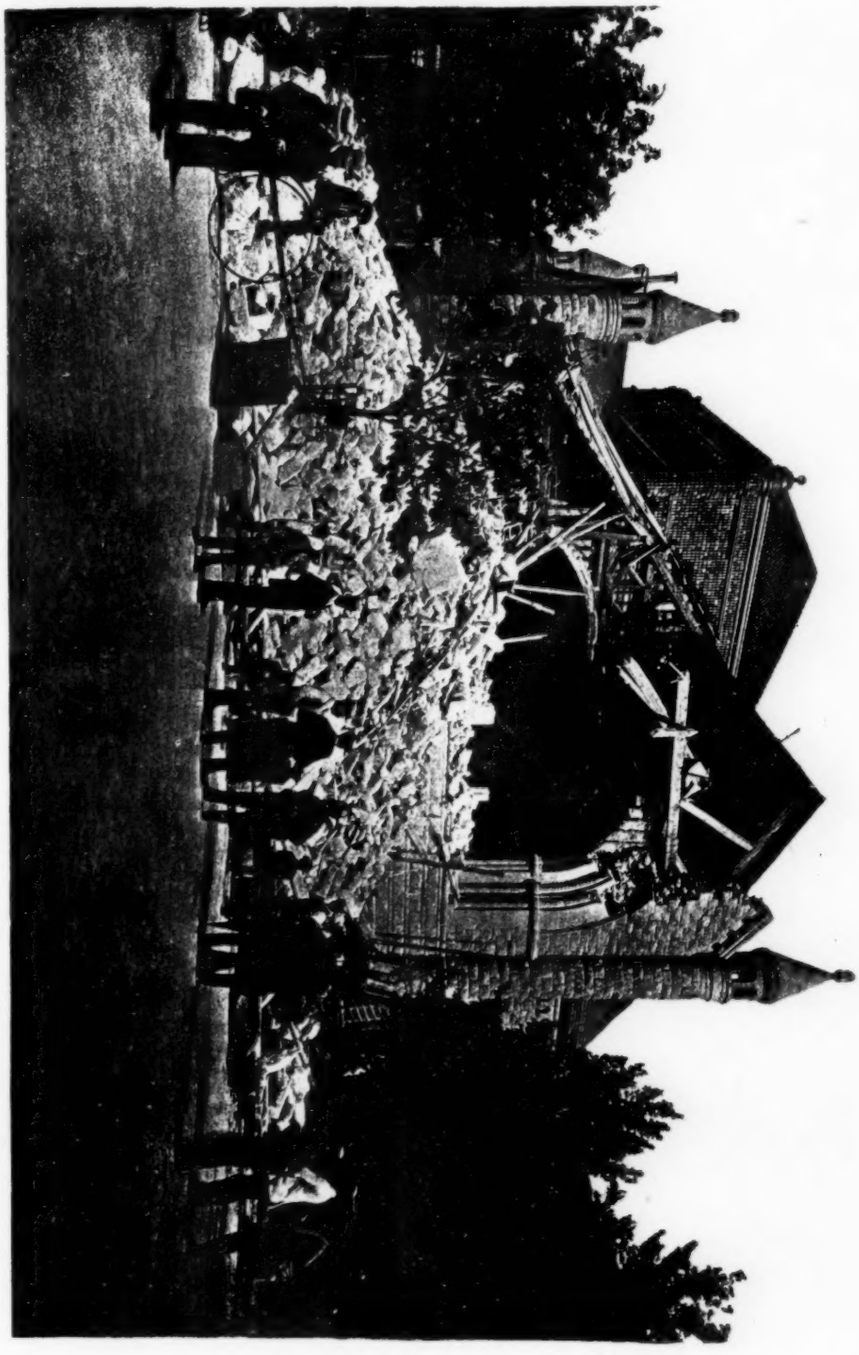

Church of the Covenant Washington D. C.

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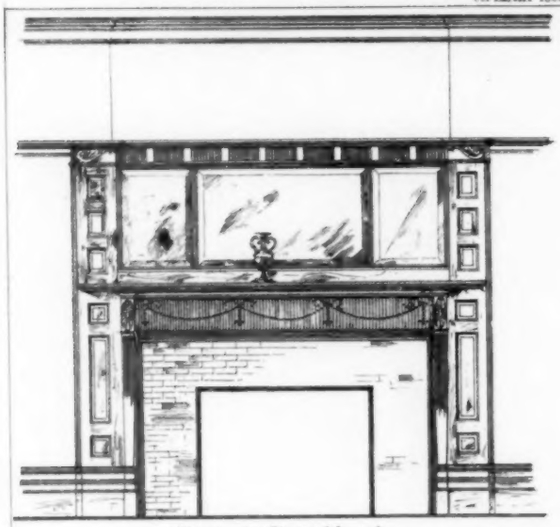
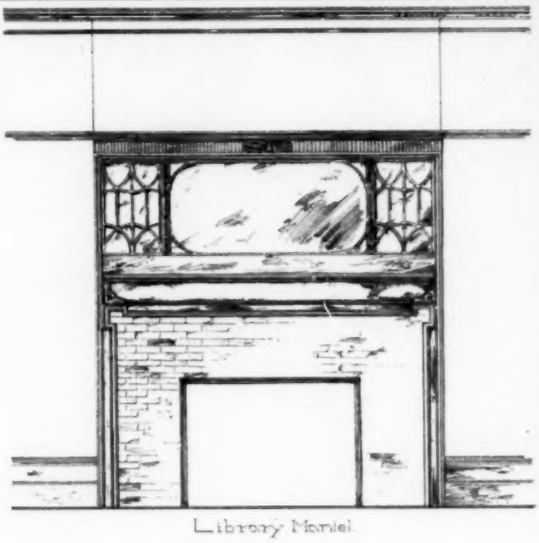
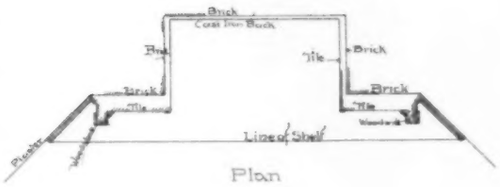


Drawing Room Mantel.



Library Mantel.



Plan

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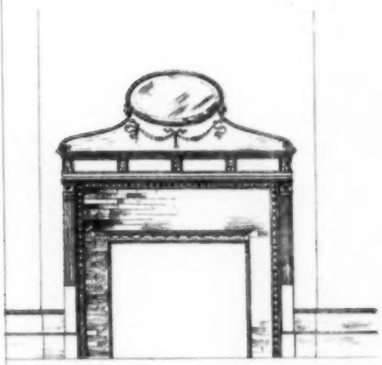
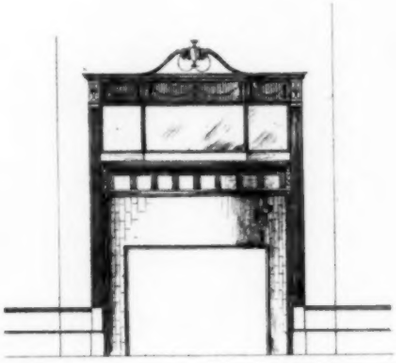
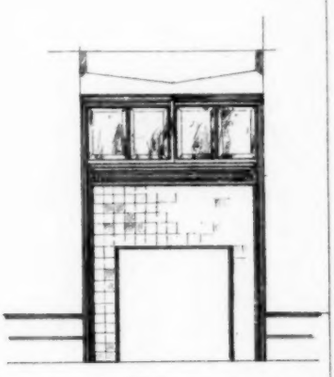
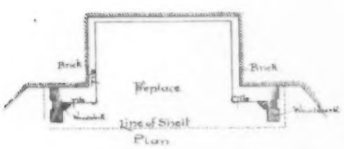


Mantel in Boudoir.





Mantel in Second Story Hall.



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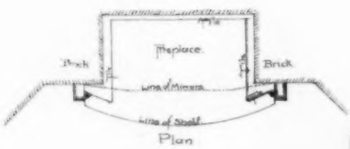

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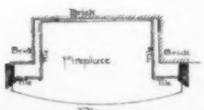
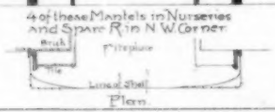
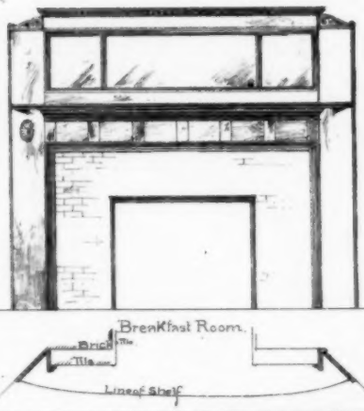


Plan

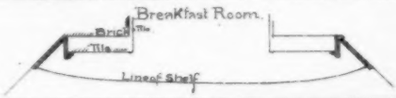
4 of these Mantels in Nurseries and Spare R in N.W. Corner



Plan.



Breakfast Room.



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Designs for Mantlepieces, R.H. Robertson, Archt.

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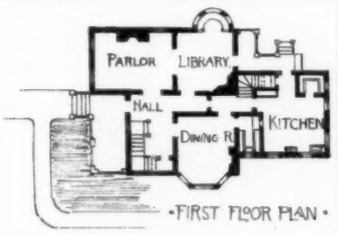
HOUSE FOR ··· A. EDWARD ROGERS :

ROXBURY MASS

· MURRAY SMITH · ARCHT. · · BOSTON ·



· FIRST FLOOR PLAN ·

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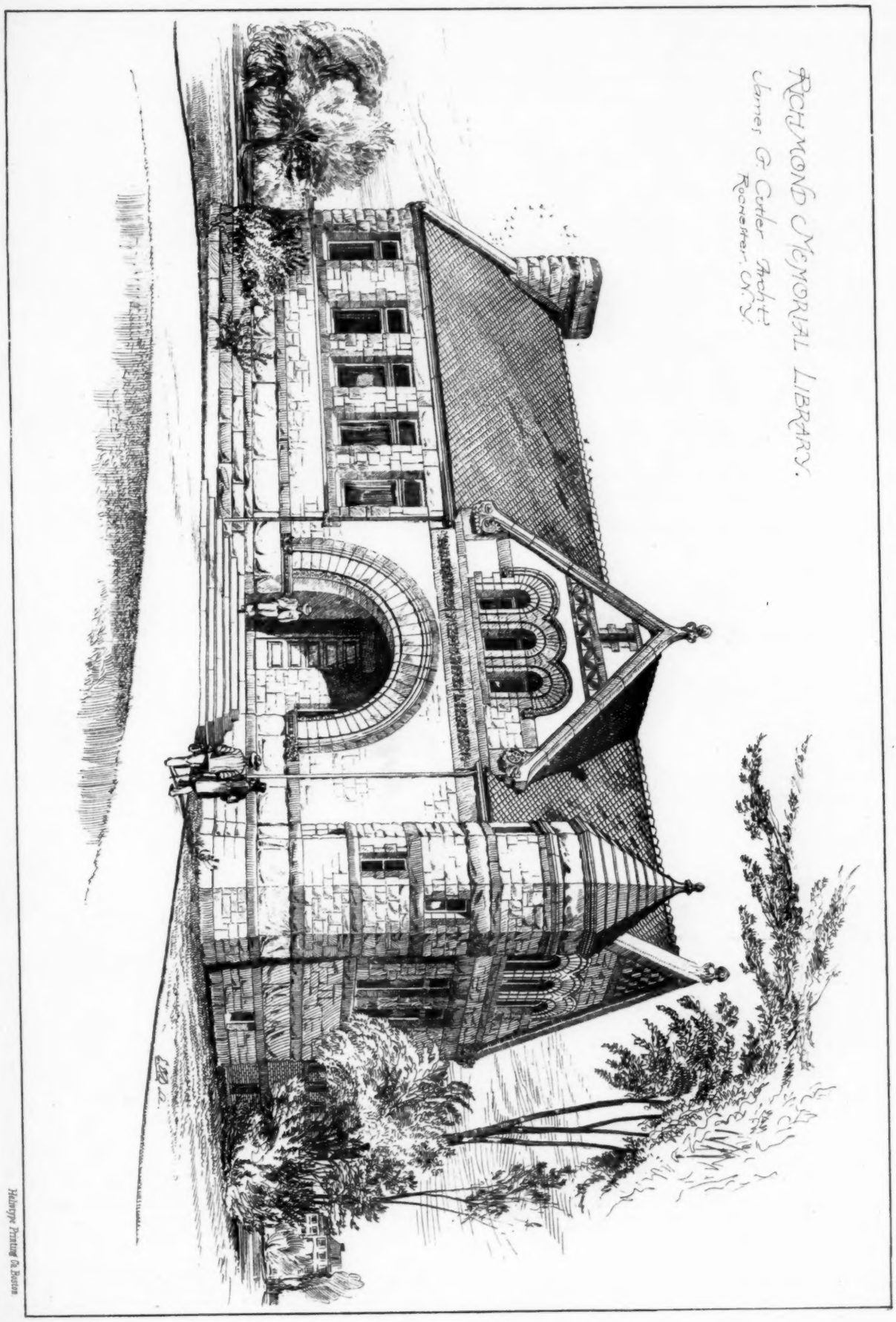

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James G. Cutler Architect
Rochester, N.Y.

Heliotype Printing Co. Boston

that any step should be taken in the right direction likely to be of service ultimately.

The Toronto Trades and Labor Council and the Minister do not agree on the subject of manual-training in schools, as proposed by Mr. Ross (Minister of Education) for the advantage of those who have to earn their livelihood by skilled labor. The Trades and Labor Council sent a deputation to Mr. Ross — who laid their case before him, but failed to convince him by their arguments. The Secretary says "that a course of manual-training, if inaugurated, will result in no good commensurate with the amount of certain harm in an aggravated form, which must ultimately ensue to all who live by mechanic callings in Ontario." This dictum is somewhat vague, but the "ultimately" saves the Secretary's bacon, *pro tempore*.

The plumbers' strike is as far away from a settlement as ever. Masters and men firmly adhere to their own opinions, each side being convinced that in the long run it must be successful.

The by-law enforcing examinations for masters and men before practising the trade, and granting certificates to those who successfully pass, continues to send men up in batches for their unwelcome ordeal. The examiners are at present exercised over a clause in the by-law, which states that licences or certificates shall only be granted to Canadians either by birth or naturalization. They consider they have nothing to do with a man's nationality, and that if he passes a good examination, he is entitled to ply his trade. If this clause is enforced, it would hardly be consistent with the notion of importing skilled plumbers.

It is satisfactory to note that there is some attempt at association of architects now being made in Toronto. The Toronto Architectural Guild, a somewhat informal institution of about twelve months' age up to date, is already beginning to make itself felt as an influential body in professional matters. At present the Guild is mainly of the nature of a social club; the members meet once a month at different places in the neighborhood of Toronto, dine together and then discuss matters of professional interest. No attempt has been made at definite organization except that each member pays a subscription and pays for his monthly dinner. There is no president or council, but the Guild has an Executive Committee of three members, one of whom is Secretary and Treasurer, and to whom, as I understand, the origin of the Guild was principally due, Mr. S. G. Curry, of the firm of Darling & Curry, architects of Toronto. The Guild had something to do with the arrangement of the conditions for the Board of Trade competition, and has made its influence felt in connection with the proposed reduction in the size of bricks by the Brickmakers' Association. The brickmakers finally agreed that their brick should be $8\frac{3}{4}'' \times 4\frac{1}{8}'' \times 2\frac{3}{8}''$, the architects being satisfied as these dimensions were very close to theirs. Members of the Guild agree to specify not less than 80 per cent of all bricks used in their work to be hard brick.

The profession is apparently in a far more healthy condition in Toronto than elsewhere in Canada. The Minister of Education intends to appoint a lecturer on architecture in the School of Technology. The *Canadian Architect and Builder* says "there are so many untrained men in the ranks of the architects, and the public are so unable to judge good architecture from bad that the few good men receive but little recognition, and that only from the cultured few." This is saying a good deal, perhaps a little too much, for although many "untrained" men have large practices, yet sooner or later the few good men cannot fail to be recognized and known pretty widely. An untrained man may make a considerable income out of his business, and always remain unknown, whereas a trained man's first building even is bound to bring him some fame.

There is also in Toronto an Architectural Draughtsmans' Association for the mutual improvement of draughtsmen and students. These efforts on behalf of the profession are highly commendable, and it would be well if other places would follow suit.

In Montreal architects are horribly jealous of each other. The English are jealous of the French and *vice versa*, and the English are jealous of each other, and the French likewise. An architect was introduced to another by a mutual friend a little while ago as "a brother professional," and was greeted with the blunt remark, "Oh, there are no such things in this country."

Students in the offices of members of the Toronto Architectural Guild come in for considerable encouragement. They are invited to compete this month for a prize of $15 in books, for the best set of measured drawings of one of the entrances to the University, a building in round-arched Gothic, with some rather intricate details.

Toronto can boast a better library of professional or architectural books than any other city in Canada, and it speaks well for the intelligence and wisdom of the Board of Management, that they so freely encourage the study of art and do all in their power to help students. The Free or Public Library is an excellently managed institution. The books on architecture and building number just about one hundred, not including some works, such as Rawlinson's "*Five Ancient Monarchies*," which are catalogued as historical. Among the books, and first in point of value, is Ferdinando Ongania's work on the Basilica of St. Mark's, Venice, which consists of several large folios of colored plates and twelve volumes of smaller plates. The price paid, I believe, for this book was $400, and duty in addition, for the Government has not yet got hold of the idea that such a thing is necessary for the education of the country.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

ENTRANCE TO THE CONVERSE MEMORIAL LIBRARY, MALDEN, MASS. MR. H. H. RICHARDSON, ARCHITECT.

[Helio-chrome, issued only with the Imperial Edition.]

GOTHIC TOWERS AND SPIRES, PLATES 25, 26 AND 27. — LINCOLN CATHEDRAL; ST. MARY'S, STAMFORD; ALL SAINTS', BUCKWORTH; ST. PETER'S, ALDWINKLE.

[Issued only with the Imperial Edition.]

RUINS OF THE CHURCH OF THE COVENANT, WASHINGTON, D. C. MESSRS. J. C. CADY & CO., ARCHITECTS, NEW YORK, N. Y.

SEE the "Letter from Washington" elsewhere in this issue.

DESIGN FOR CHURCH AND CHAPEL AT SECOND AVE. AND 72D ST., NEW YORK, N. Y. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

MANTELPIECES. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

HOUSE AT BRIGHTON HILLS, NEWTON, MASS. MESSRS. WAIT & CUTTER, ARCHITECTS, BOSTON, MASS.

HOUSE FOR DR. A. G. CURTIS. MR. E. A. KENT, ARCHITECT, BUFFALO, N. Y.

RICHMOND MEMORIAL LIBRARY. MR. J. G. CUTLER, ARCHITECT, ROCHESTER, N. Y.

HOUSE FOR A. EDWARD ROGERS, ESQ., ROXBURY, MASS., DESIGNED BY MR. MURRAY SMITH, BOSTON, MASS.

CINCINNATI

SUIT OVER A RETAINING-WALL.

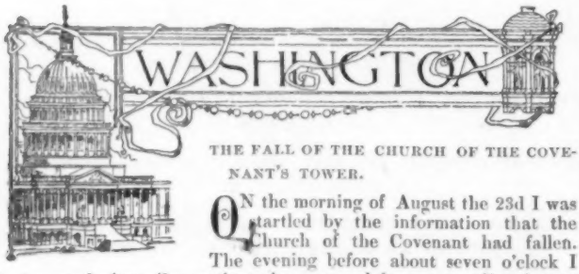
A SUIT was recently decided by Judge Drummond of the United States Circuit Court which will be of interest to architects in general. The case in question was a suit by the United States Government against the estate of George A. Smith, and it appears from evidence that the Smith estate was erecting an eight-story office-building parallel with the United States Government building, with an alley ten feet wide separating their building (which was one hundred feet long) from the Government building.

Mr. Smith's wall went down twenty-one feet below the curb-stone and was three feet six inches wide at the bottom, carried up a distance of ten feet, with batter of six inches, and the remaining height of the wall was built of a uniform thickness of two feet six inches. This wall acted as a retaining-wall and was carried around on Walnut Street as well as on the alley. The wall on Walnut Street stood all right and is still standing after a lapse of some two years, but on the alley the wall for a distance of about fifty feet in length fell-in before it was fully completed, and in falling carried all the earth in the alley clear back to the Government retaining-wall and undermined their sidewalk, which was made of Portland cement. This sidewalk stood for some two months afterwards, self-supporting, but finally, owing to one cause or another, broke off and fell, and this suit was for the payment of this sidewalk.

It should be stated that when the caving of the alley took place the filling which had been made by the Government was composed of all sorts of débris, such as street scrapings, tin cans and what-not for a depth of some six feet below the grade of the alley. Below this point the filling was of the proper material, to wit, gravel. The Government retaining-wall was thirty-two feet deep below the alley and was eleven feet thick at the bottom, and was off-set on the alley side in steps of about four feet in height and from nine inches to twelve inches thick. Mr. Smith's defence against the action of the Government was that the fact that the Government in building their wall in the way just described had made all the filling in the alley act as a wedge against the Smith wall, thereby throwing on his wall the entire burden of the support of the alley, and the defence further claimed that the Government wall did not support any of the alley

filling. The defendant Smith claimed that the Government in building their wall in off-sets did not tend to support the alley at all, as they were bound partly to do, but that these off-sets in their wall simply supported so much of the earth as would form a triangle on each ledge, which virtually amounted to nothing, and that all the rest of the filling, as has been stated, was thereby thrown against the Smith wall. The Government claimed that the Smith wall was too weak to sustain its proportion of the filling in the alley, and that the defendant should have taken in all the surroundings and should have made his wall of a sufficient thickness to overcome these contingent circumstances, but the judge wanted to know of the plaintiff's attorney how far he would carry that proposition. Would the defendant be required, the judge asked, to expend a large sum of money to overcome such surrounding circumstances as the plaintiff indicated? The plaintiff's attorney was forced to answer in the negative. And then the judge wanted to know if the defendant did not have to spend a *large* sum of money for such a purpose, why should he be compelled to spend *one dollar* over and above what is usually necessary in building walls of this nature?

Judge Drummond, in deciding the case, said the defendant had a right to suppose that the alley had been properly filled; that the plaintiff's wall was built as such walls are usually built; that the defendant seemed to have used all diligence and care in the building of his wall, and that he was not compelled to build his wall thicker than was necessary to hold up one half of the alley, supposing it to be properly filled and the plaintiff's wall properly built. He therefore decided in favor of the defendant.



THE FALL OF THE CHURCH OF THE COVENANT'S TOWER.

ON the morning of August the 23d I was startled by the information that the Church of the Covenant had fallen. The evening before about seven o'clock I had passed along Connecticut Avenue, and it was standing intact, apparently strong and firm. Shortly after hearing of the disaster I visited the ruins and found the church in the condition shown in the illustration. A Committee, or Commission, consisting of Bernard Green, Civil Engineer ex-assistant to Colonel Casey, Thos. B. Entwistle, Inspector of Buildings, and Clifford Richardson, Inspector of Asphalt and Cement, was appointed by the District Commissioners [our executive rulers] "to investigate all the circumstances connected with and pertaining to the fall or the falling of the tower of the Church of the Covenant." It is noteworthy that no architect was appointed on this commission, and that a chemist was the third man where we would have expected an architect.

No one having been hurt, of course no criminal action could be brought against any one, and it will undoubtedly be a question for the courts to decide as to who is monetarily responsible. The investigation, one of the District Commissioners asserted in an interview, was to see if the Inspector of Buildings was in any way derelict in his duties. In fact, this was the only ground on which they would have had authority to order such an investigation as there was no one physically affected: the matter was a monetary question between the architects, Messrs. J. C. Cady & Co., of New York, the builder, W. C. Morrison, of Washington, and the Board of Church Trustees.

The Commission was badly constituted for its purpose. The Inspector having already passed judgment on the plans, as well as representing himself, while a chemist was of little practical value in making tests of pulverized lime and cement mortar. Mr. Greene seems to have been the only one of the three who should legitimately have been appointed for the purpose.

The report of the Commission was handed in on September 6. The long delay being necessary to have the débris cleaned away so that the original foundations could be examined.

Although the Commission was poorly constituted, the report was full and clear.

First, the specifications and methods of construction called for by the architect's plans were described, and then the method of construction and materials used by the builder.

Although cracks and signs of failure were noticed months before, only a few were aware of the fact.

The tower was one hundred and thirty-three feet and three inches above the concrete footing.

I quote from the report, as the description is full, and most of their conclusions seem to be correct.

The masonry of the tower had been finished excepting a few pieces of the last or coping course of stone and the four terminals for the corner-turrets, one or two days' work of the masons. 'When the height of sixty feet was reached at the beginning of the winter," the report says, 'a few slight cracks were observed in the water-table and sill-course and in the joints of the rubble foundation just below the water-table. As the work went on through the spring and summer these cracks increased in size and others continually appeared in various parts, generally distributed throughout the base of the tower from the sandstone tablets down into the foundation walls. The growing uneasiness of the contractor and building-committee on this account became, during the last week or two before the fall, real anxiety. They did not fail to notify the architects, who made examinations and assuring reports, as we show below, and who allowed the work to proceed.

"Finally, in the afternoon of August 21, a large stone in the south door-opening on the first floor, was heard to crack with a loud report, followed from hour to hour by other cracks, and especially a vertical one in the west jamb of the same door-way, which opened several inches, the wall separating at its centre like a clam-shell. This was observed at its maximum about nine o'clock in the evening, and several small pieces of mortar and stone were heard to fall from an apparent height of twenty feet inside the tower at the same time. Thoroughly alarmed by this time, the contractor and a member of the building-committee caused the sidewalks and all approaches to the tower to be barricaded, and directed the watchman to remain outside of the building during the night. High wind gusts had occurred at intervals during the day and again about the middle of the night sufficient to have produced a slight jarring effect upon the tower, and undoubtedly hastening the crumbling observed. The watchman heard occasional cracks during the night until 4.25 o'clock in the morning. While he stood on the N-Street sidewalk, between Eighteenth Street and Connecticut Avenue, in company with a policeman, the two men heard continued sounds of cracking stone followed quickly by the falling of several pieces of stone within the tower, and in a few moments observed the lower portion of the masonry crush and bulge, and the whole mass sink down vertically upon its own base, crumbling into a pyramidal heap of stones and sand, and filling the air with a dense cloud of dust. It is significant, also, that the sound of the fall was heard by few persons in the neighborhood, being more like that of an avalanche of gravel and sand than of a strongly coherent stonework requiring much force to break it up. The eye-witnesses say that the belfry came down intact and erect until it reached the heaping pile, where it went to pieces and was scattered uniformly over it.'"

. . . . . .

"It must be said that the specifications and designs themselves are also at fault;" first, in specifying rubble-work for the walls laid in a mixed lime and cement mortar, and then not making the foundation walls much thicker and stepped up near the top with a capping of large, flat stones to receive the superstructure walls or piers. Furthermore, the masonry should have been required to be done with extraordinary care and skill, such as to raise it well above the class of ordinary rubble-work. Although quite aware that excellent mortar can be made of a mixture of lime and cement, we deprecate the use anywhere, in a tower of this sort, of any but the best pure, hydraulic cement mortar. In usual practice it is difficult enough to get even this properly made and used, not to complicate the work by admixture of lime. Therefore, while the statement would be untenable that the tower, and even the foundation walls in question, could not have been built of the given dimensions with great security even in rubble-work, by using the requisite materials and workmanship, we must regard an ordinary specification, such as the one now under consideration, quite inadequate for the purpose. A higher class of materials, workmanship and system of construction should have been specified, involving, of course, a somewhat greater cost, but none the less essential on that account. Rubble masonry is the lowest and poorest class of mortar stonework and a fabrication entirely by the mason. The stones are not prepared and assigned to positions for him. The foundation walls should have been of hard-burned brick, squared stone, or thicker in high-class rubble, as stated, and the ashlar backing of hard brickwork or excellent stone masonry, all laid in best hydraulic cement mortar. With proper and more constant inspection, direction and supervision, very much better work than was done would have been secured, even under the specifications as they stood, and the tower would not have fallen, but yet the margin of safety in it would have been too narrow for a really substantial and permanent structure.

"In short, the specifications, as to the tower masonry at least, were too general in their terms, not even distinguishing between the comparatively dwarfed and lightly-loaded church walls and the lofty, heavy, storm-beaten tower. They dwelt too briefly upon the details pertaining to strength and stability, and left too much to the interpretation of the contractor, local building-practice and the specified supervision of the architects. The clause that the ashlar shall 'be laid up after the most approved system of random ashlar work' seems to refer to the appearance it shall present to the eye rather than to its bond as an integral part of the wall. Nor did the drawings supply details of construction of the rubble or the ashlar masonry. They contained nothing whatever to indicate how or to what extent the work should be bonded, or the sizes, shapes and distribution of thorough or other bond stones, or the kinds and frequency of anchors, clamps, strap-iron or other devices for tying and knitting the work together.

"Even the specifications as they stood, however, were not complied with by the builders, in several particulars, seriously affecting the strength of all masonry. Thus the rubble work was not 'well

bonded,' and the mortar did not contain 'best brand of Rosendale cement.' Neither did the stones of the ashlar fulfil, in a proper sense, the specifications as to minimum thickness, depths and heights. It is true that a considerable number measured somewhere within these ugly shapes the full thickness required, but very rarely at the points meant; namely, on the bed and build joints, and in almost no instance on both in the same stone. The stone averaged less than the minimum sizes, a large number being mere sharp-edged slabs difficult to secure well in place without iron anchors and incapable of good bond with the rubble backing. The specifications of minimum sizes implied a goodly number of larger stones, but these were almost entirely wanting. The specifications to use 'galvanized-iron clamps, wherever necessary or expedient, to the ashlar and backing together,' was also practically disregarded throughout.

"Therefore the work was not 'first class; of the best kind,' nor 'performed in a thorough and workmanlike manner,' and of course the contractor did not 'well and sufficiently erect' the tower 'agreeably to the specifications, in a good workmanlike and substantial manner,' but did evidently do so 'to the entire satisfaction' although not under a sufficiently close and continuous 'direction and supervision of the architects' because the latter were not exercised. The deplorable results were due in great measure to an entire absence of any continuous personal direction, supervision, or inspection by the architects, or their representatives, other than some occasional visits, for a few hours or a day each, at intervals or some six weeks. In the beginning the church committee endeavored to secure local superintendence of the work, but the architects naturally objected, and positively refused to entertain any such proposition, even to the extent of timing their visits of inspection by any notice from the committee or their agents, and the question was set at rest finally by the following paragraph in a letter of the architects under date of April 9, 1887, before work on the building had begun: 'We feel, however, that we cannot in so important a building as this take the responsibility (of "absolute control of the building and work") without using our own judgment as to when and how often we should visit it, so we propose to make such visits according to our judgment, and the committee can pay whatever portion of our traveling-expenses they see fit. We had much rather assume a burden ourselves in this way (although it is entirely contrary to professional practice) than to run the risk of so important a building miscarrying.' And so this arrangement has continued from the beginning to the present time.

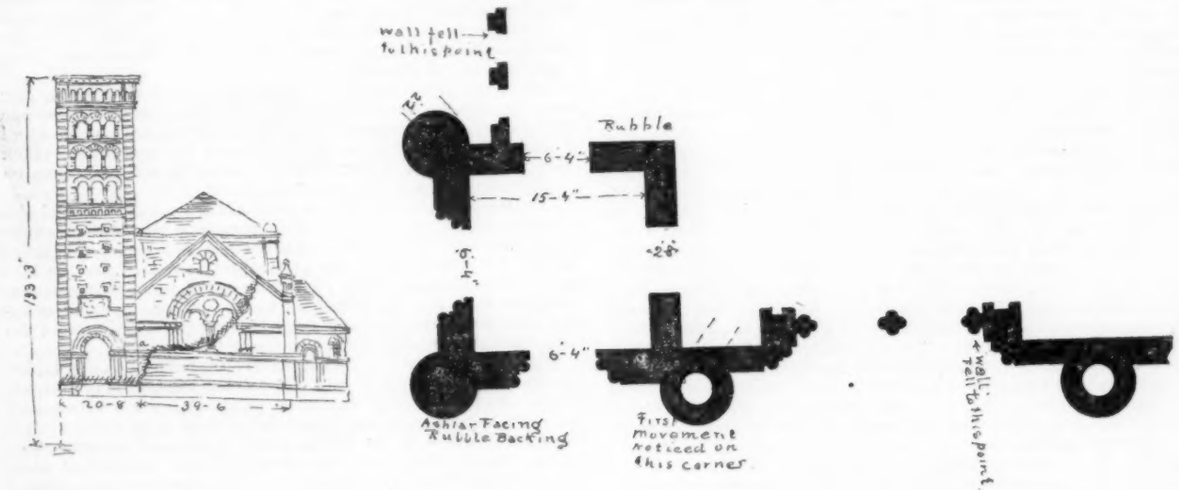
"Masonry to be suited for a tower of this kind, and above all a rubble masonry, should have been watched constantly by a competent inspector. In this case it was all left to the masons excepting one inspection when started on the concrete footing, a second when the water-table had been reached, a third at a few feet above the doorway arches, a fourth when the tower was at half height, and so on. The stone-cutters, mortar-makers and masons had their own way the rest of the time.

"When the cracks appeared and as they increased, the architects were sent for and came and made examinations, which they reported upon to the committee. Thus, the following resolution was sent to the architects on January 16th last: A resolution was sent to the architects by the building-committee notifying them that they had learned that the cement and mortar used in the building was not of the quality called for, and in some other respects the work had not been carried on according to the provisions of the contract, and that it seemed to the committee that these defects would not have occurred if there had been a proper supervision of the work by the architect.

"On resumption of work in the spring the architects examined and approved it and allowed it to go ahead. Correspondence regarding the continued appearance and increase of the cracks followed, together with some inspections by the architects who, on June 6th, when the work had reached the belfry stage, reported 'that there was no danger, that the tower would certainly not fall, nor any portion give way suddenly without due warning,' and on June 13th, that they 'considered it safe to proceed slowly with the tower and to finish it according to the original plan, except, perhaps, in the matter of the heavy stone cornice at the top and the heavy tile termination, for which a lighter material may be used to lessen the weight.' From this time until the fall they relied on information, at short intervals, from the contractor, that the cracks were not increasing much and there was no cause for alarm.

"Thus, in brief, it appears that the architects' design of the foundation-walls and specifications for the construction of the tower were faulty; that, largely for want of the intelligent supervision required of the architects, the contractor's materials and workmanship were inferior and unsuitable, and that, therefore, the beautiful tower fell. The manner of its fall and its complete reduction to a solid heap of small stones and thoroughly disintegrated mortar showed its general weakness so plainly that the wonder was not that it fell, but rather that it stood so many weeks erect.

"In form and dimensions the design of the tower furnishes a thoroughly substantial and permanent structure, needing but the simplest kinds of good materials and workmanship for its proper erection. There is no reason on this score why it should not be at once restored. Its proper construction involves no unusual difficulty or expense. Its height is but moderate, for there are numerous entire buildings of equal height in the large cities. The remaining walls of the church were, of course, built in the same defective manner as the tower, more pains being taken with their exterior appearance than their strength. Being very low and comparatively thick, however, and carrying but little weight except their own, we cannot say that they are not perfectly safe, but we recommend an examination at a few points to fully put their condition beyond question."



The want of constant inspection necessary, of course could not be expected from the Building Inspector of the district, but as the character of the stonework, the shape of the rubble, and the bevelled beds of the ashlar and the character of the mortar and cement used was continuous from the footing to the capping stones, it seems that either the architects or Building Inspector, particularly the architects, should have noticed its faulty character, if not in accordance with the plans and specifications, and called a halt. The defects were not in some one piece of construction that could be covered up in an hour, a day or a week, but the same faulty masonry was continuous for nearly a year.

The report tells us that the strains were properly calculated for the best character of rubble. I do not think that much dependence could be placed on rubble piers two feet by eight inches thick at the base of a tower over a hundred feet high. The corner projection had a vent-flue allowing a wall one foot thick around it, including ashlar and backing. After the tower was up some distance this was filled with concrete by order of the Building Inspector. Instead of strengthening, this concrete by expansion may have weakened the stability of an unstable pier.

The weights as given seem excessive to impose on rubblework. Rankine says the resistance of common rubble to crushing is not much greater than the mortar it contains. The weight on these piers was 140 to 190 pounds per square inch, increased to 220 pounds in case of winds, according to the calculations of the Commission. So a strain of 15 tons per square foot was liable to bear on some one of these piers. Kidder says the granite piers of the Saltash Bridge (presumably masonry of squared stones) sustain nine and one half tons per square foot, while the highest pier of the Rocquefavour stone aqueduct, Marseilles, sustains a pressure of 13½ tons per square foot. Mr. Louis DeCoppet Berg in his table, article "Safe

Building" (in the *American Architect*, July 3, 1886), gives as crushing strength of Rosendale cement and lime mortar (the kind called for in the specifications) 550 pounds per square inch, or the safe load as 125 pounds per square inch. Nearly double this weight was liable to come on the piers and this only allows a factor-of-safety of a fraction less than four and a half, while Kidder and Trautwine call for a factor-of-safety of from six to ten. Using a factor-of-safety of six (the lowest for piers), the weight that the piers should have borne safely is 91.4 pounds per square inch, or less than half the weight that was actually on them according to computations made by the Commission.

Who is to replace the work is still an unsettled question, and it is a question, I think, that the courts will be required to settle.

The subject being an unusually interesting one I have necessarily lengthened my letter. The accompanying sketch of the church before the failure, made from the plans, and the ground plan of the fallen portion will show the extent of the ruin.

IMPROVEMENTS AT EDGEWATER.

EVEN Chicago people scarcely realize the wonderful rapidity with which the suburbs are growing and making of the country within a radius of fifteen miles from the court-house practically one great city, even if not under one central administration. The opening about two years ago of a second railroad to Evanston (fifteen miles to the north) has brought into the market a long stretch of country directly on the shore of Lake Michigan, which was previously accessible only with great difficulty. To many people the lake shore has irresistible attractions and is above all else to be desired as a locality for residence, and, as a result, numerous little villages have either sprung suddenly into existence or else been stimulated into lively growth by this new railroad.

Most of these new suburbs are as like as possible to imagine, with their little wooden cottages built upon twenty-five to fifty feet of ground. However, one of these towns has started out on a decidedly higher level than anything attempted within recent years in the vicinity of Chicago, and a very large sum of money has already been expended in really permanent and desirable improvements at Edgewater, as the place has been called. A Philadelphia syndicate purchased quite a large tract of land at this point (which is something like seven or eight miles from the centre of the city) and two years ago commenced a series of improvements which have caused several of these acres to be changed from waste land and barren sand-hills into pretty country-places, each house having all the most modern conveniences. The scheme has been to make a model town and, as a result, rules and regulations abound and flourish to such an extent as to somewhat disturb the equanimity of the freeborn American who fondly imagines that in buying a piece of property he buys the right to do about as he pleases with his land. Here, however, the individual is apparently very quickly brought to his senses and duly given to understand that he is a mere infant and that all his needs will be properly attended to by the parental corporation which knows what he should have and what he should not have. But however the rules and regulations may effect the feelings of the inhabitants, the results attained are extremely attractive to the eye of the observer.

For something like a quarter of a mile from north to south the sand-hills have been levelled, streets laid out, water-pipes and sewerage put in, and a town blocked out. Not only have the streets been merely staked out, but they have been curbed with stone and, at an evidently great expense, macadamized. Good-sized trees have been planted at each side and broad stone sidewalks put down, so that the roads within the improved district are similar to the city boulevards. Water is brought from the water-works of the town of Lake View at the south, but the sewerage system is for the village only and empties into the lake, a condition of affairs that will undoubtedly eventually require some serious attention and probably a change.

The idea of the promoters of this enterprise has been to make a thoroughly first-class suburb, and with this aim in view they have laid out large lots and refuse to sell to parties who do not guarantee to build houses equally as good as those already erected. With one or two exceptions all the work here has been under the supervision of a single architect. The buildings are all extremely picturesque in outline, having a strong touch of the colonial, which is well carried out in the use of shingles much more lavishly than is usual in this part of the country. The railroad-station itself is a neat little structure of wood, mostly covered with shingles, and while quite unpretentious at the same time has a certain prettiness about it that elicits remark. This station has a handsome and well-kept lawn, with flower-beds at two sides, while the name "Edgewater" is spelled out upon the green in beds of foliage plants, thus making a strong contrast to the adjoining stopping-places and in a certain way giving the key-note to its superiority. Moreover, it is a superiority that seems to be maintained through the whole town. Evidently everything is done for effect, but it is not with a splurge, for all is quiet, dignified and in extremely good taste, breathing a spirit of refinement that is truly refreshing. Most of this effect is no doubt due to the ability of one man, for, as noted before, one architect has done the work.

The houses all seem to be well built, most of them having the first story of either red or white brick and the upper portions covered with stained shingles. The interiors are principally finished in the natural woods, California redwood and Georgia pine predominating. Most of the houses are architecturally good, but two or three are noticeably so on account of their particularly quiet and dignified appearance and their charming outline. Had they been built anywhere but in a widely-advertised suburb they would have attracted more than usual attention and a more just appreciation.

In all, about thirty buildings have been erected by the syndicate and they have been offered for sale at terms unquestionably reasonable; but, apparently, quite a large number are still unsold and rumor has it that the projectors feel considerably discouraged by the small number of sales during the past year.

To an ordinary observer it would seem as if the experiment of putting upon the market so expensive a suburb was several years in advance of the demand, and it cannot be greatly wondered at that many of their houses remain tenantless, for there is still an immense choice of land for suburban homes in the vicinity of Chicago. People willing to pay from six to ten thousand dollars or more for a house are not attracted to an absolutely new locality with all the possibility of malaria and the discomforts of being removed from friends, schools, churches, etc., when there are a dozen other and older suburbs that for that same money can offer nearly as much elegance, and a certainty of agreeable society and good markets.

Each block has its alley running from north to south, and here, with the regularity of a line of soldiers, are placed the garbage-boxes, all of exactly the same shape, size and color. These alleys are particularly intended to be used by the butcher, baker and candlestick-maker, so that all disagreeable traffic will to a very great degree be kept off the streets.

One of the great features of Edgewater is the electric-light, for gas is not brought into the village, but the streets and all houses are lighted on the incandescent system by electricity, and moreover all of this at present is done at the expense of the syndicate. When everything is lighted up the effect as viewed by the passengers on the night train is certainly extremely pretty.

The lake beach at this point is unusually broad and composed of a beautiful yellow sand. Eventually this must be one of the features of the place and evidently the syndicate is of the same opinion for at present it is impossible to buy any property directly upon the lake shore. One street, however, runs down to the water's edge, and at that point there is a tiny little park which serves as a post of observation for those who wish to see the lake or the inhabitants of the town when they take their swim in the surf of the lake.

Edgewater has four public institutions: the town store, the stables, the electric-light building, and, last but not least, the lawn-tennis courts. The town-hall, if it may be so called, is quite a feature of the place being a large and simple building of good outline. It is the general centre of the village, and is at one and the same time school, church, theatre, post-office, town-hall and the general store. The assembly-room in the second story is a fine large hall that will allow for a considerable growth of population before the inhabitants will find themselves crowded at their gatherings. A somewhat similar remark might apparently be made in reference to the lawn-tennis courts for they never seemed to be thronged, but, just the same, notices are very conspicuous as to the kind of shoes that players must wear, as if with such a host (generally four people once a day), common shoes would at once destroy this public institution.

At the extreme south end of the town is another of the public institutions — the stables, for no one is allowed the privilege of having a barn on his premises, but all the animals must be kept at the public establishment and telephoned for when wanted. This barn has a court in the centre which is reached through a broad archway, and around this court are arranged the carriage-house, stables and carriage-wash together with necessary living-rooms and office. The exterior of the building is very simple with brick below and shingles above, but the effect is decidedly pleasing, and everything about it seems to be kept in as neat and proper a way as the rest of the settlement. At the other end of the town is the fourth of the public institutions, the electric-light building. It is conveniently located for receiving coal, etc., from the railroad and while built out of the commonest material still has the same general characteristics of dignity and artistic effect as the other buildings. In fact, with but one or two exceptions each and every building in the place when considered individually, is worthy of praise, but when taken collectively, the continued use even in varied forms, of exactly the same material in the same style, causes an involuntary wish for a change. Probably as other architects commence to build here this criticism will cease to have a foundation, and in due time all will blend into a much more harmonious whole, than in any other suburb, since the start in this case has been so exceptionally good that future builders must take the fact greatly into consideration when making their designs.

SAFETY FROM FIRE.

Door-Knocker

from the Union Brass Architectural Works
Chicago, Ill.

THE terrible loss of life by the conflagration at Springfield, Mass., a few months since, has aroused the public mind to a degree never before witnessed to the constant peril to which the people of all places and conditions are exposed from fire, and in consequence the last Legislature, in response to the call of the public, passed some laws for the further protection of the people from destruction by fire.

The importance of the subject of protection from fire cannot possibly be overestimated, and the anxiety of the public in reference to it is justly very great, and now that the Legislature of the Commonwealth has taken the matter of safety in hand and passed laws in reference to it, requiring certain kinds of fire-apparatus to be provided and used for the saving of life at fires, it may be well to examine the character of the various kinds of life-saving apparatus which the law prescribes shall be provided and used by each and every organ ized fire-department in the State, and to do so is the object of this communication.

In Chapter 426, stringent regulations are made in relation to the means of egress and escape from buildings where there are many occupants and working people — as boarding-houses, hotels, apartment-houses, tenement-houses, factories, etc. — all of which are to be kept under the most rigid inspection by officers appointed for the purpose, and these laws, if thoroughly enforced, will go far to prevent in the future the fearful holocausts of the past.

Chapter 310 is "an act to require the equipment of fire-departments with apparatus for the saving of life at fires."

The act prescribes the apparatus to be used by all the organized fire-departments of the State, and it consists, first, of a "gun or other suitable device capable of shooting or throwing an arrow or other missile with a cord attached thereto over the top or into any window of any building within such city or town, together with all needful appliances for properly working the same."

This arrangement is for the purpose of enabling the occupants of the chambers of buildings on fire to establish communication with the fire-department in the street, and to draw up a rope or any other means by which to facilitate their escape from destruction. The act requires the use of "jumping nets."

The plan of communicating by the "gun and arrow" has long been known, several devices of the kind having been invented at different times in Europe. But doubtless the best one of all was invented many years ago by Mons. Delvigne, for use in the French coast wrecking service. A full account of this invention was published quite a number of years since, and of its adoption into our own wrecking service by Hon. R. B. Forbes, whose earnest, long-continued and successful efforts in establishing the means of saving the lives of shipwrecked persons have long been known and appreciated by the entire nation.

In an address upon the subject at a meeting of the Massachusetts Technological Institute, some ten or more years since, Mr. Forbes gave a full description of the gun and arrow invented by Delvigne, and of its value in our wrecking service, and also proposed its use by the fire-departments of the cities for the purpose of sending a life-line to persons in danger in the upper rooms of buildings on fire.

Had this, or some similar device — as a powerful bow and arrow — been used at the burning of the Southern Hotel at St. Louis several years ago, and on other similar occasions, a very large number of lives might have been saved, for in almost all cases of conflagration of large hotels and similar structures there has always been time enough to bring the gun and arrow, with life-line attached, into use.

The act of the Legislature further requires that there be provided, as follows: "A chute, so called, made of canvas, or other suitable material, rendered uninflammable, of sufficient length to reach at a proper angle of inclination from the ground to any window in such building, said chute being provided with proper means of fastening the upper end thereof, and having a flexible ladder attached thereto." And the act requires that each organized fire-department in the State shall be provided with one or more of each and all the pieces of life-saving apparatus above mentioned, and that the members of the various fire-departments shall be periodically practised and trained in the use of the same.

It has been demonstrated in thousands of instances that a canvas chute is of all things the best and safest as well as the quickest means by which persons may descend from the windows of high buildings.

But the difficulty in using the canvas chutes is that they will quickly be set on fire and destroyed by the showers of burning cinders and the flames bursting from the windows around and below them during the conflagration.

It is well-known that the most powerful fire-engine will not throw anything like a solid, unbroken stream beyond the height of from three to four stories. Above that distance the stream breaks and scatters. Consequently all portions of the canvas chute which extend beyond three to four stories will quickly be set on fire and consumed by the showers of burning cinders and the rush of flames from the windows beneath it.

Nor can the canvas chute be thoroughly wet and kept so even to the distance of three or four stories, for the point of danger is of course, on the under side, where it is constantly exposed to the sudden rush of flame from the windows beneath it, for unless every part of the chute is kept constantly wet the flames would quickly dry the cloth in places and burns holes in it large enough for persons to fall through to the pavement below.

To be able to wet the chute with the hose pipe from a ladder is at best a doubtful thing for fire has an ugly habit of "marching on" — and at any moment the rush of flames from the windows may drive the firemen, with their hose pipe, from the ladder and leave the chute to be consumed. A few weeks since, at a large fire in Detroit, Mich., several firemen were on a long ladder operating against the fire; all at once the flames burst through the windows and they were obliged to slide down the ladder with all possible speed, and got quite badly burned at that. Similar instances are constantly occurring at large conflagrations, and they demonstrate how little reliance is to be placed upon the idea that the firemen can generally wet the canvas chute constantly and effectually from ladders.

The act of the Legislature, Chapter 310, prescribes, under penalty, the use of an "uninflammable canvas chute."

The language employed is, we think, highly misleading. Almost every one would suppose that the term "uninflammable" signified fireproof. But this is a great mistake. It means only that the cloth will not burn with a flame.

This is a point of very little importance indeed. The uninflammable" canvas chute, when exposed to contact with flame, will take fire readily, will smoulder and burn and be quickly destroyed notwithstanding its alleged "uninflammable" character.

The thing the public must have for safety is a fireproof canvas chute. This alone will meet their want. If any "uninflammable canvas chute" exists or can be produced which is really fireproof, the fact can readily be shown by exposing it to the contact of a good-sized fire and letting the flames envelop it for the space of half an hour or more. The test demanded is a fair one, and can easily be applied. We would remark here that the application of carbonic acid gas, etc., to make a canvas chute fireproof, would necessarily be transient in effect and practically of very little account.

There is one thing only which will make a canvas chute non-ignitable, non-combustible and absolutely fireproof, and that thing is water, constantly and thoroughly applied to each and every portion of the chute at whatever height it is placed and throughout the time of the longest conflagration.

The act, as we have said, requires also the use of "jumping nets," held up by several men on the street upon which the persons in danger in the chambers of buildings on fire may alight. In Prussia, where, we believe, this mode of escape was first introduced, the soldiers of the army, who largely constitute the fire-departments of the cities, have long given exhibitions of skill and daring by leaping from the windows and roofs of high buildings and alighting safely on the "jumping nets" or "canvases," and there have been successful exhibitions of the same skill and courage also given by the brave firemen of Boston and other cities.

But it should always be remembered that to perform these acrobatic feats in broad daylight, when no conflagration is in progress, is a very different thing from performing the same at midnight, when the fire is in full blast, the flames leaping upward and around and rapidly approaching, the stifling smoke obscuring the sight, the showers of burning cinders filling the air and the tumult going on below.

At such a time the most skilful expert in jumping from upper windows would need all the nerve and self-possession which he has to take the fearful leap, and the most consummate skill would be required to clear the awning frames and other obstacles below and reach with certainty the "jumping net."

What, then, would be the "jumping net" to women and children, and even to men, who are aroused at midnight and amid the scenes we have described be required to leap down from the dizzying height to the "jumping net" below?

True, there may be instances in which it could be used successfully, and therefore, to meet these possible cases, by all means let the "jumping nets" be provided.

The truth is that the public are too easily satisfied and altogether too superficial in their investigations. They stand by and see "fire

escaping apparatus" of different kinds operated by expert firemen in the day time, and do not remember that it is one thing to "play have a fire" and quite another thing to face the stern reality, involving, as it very, very often does, the question of life or death to many and perhaps to hundreds of human beings.

Whatever is adopted for the further security of human life from destruction by fire, let it by all means be something which is as far as possible real and trustworthy. In this question there is no room for any inefficient and uncertain "fire escaping apparatus." There must be no trifling with priceless human life.—*"Safety," in the Boston Journal.*

NOTES & CLIPPINGS

Russian Book Collectors.—It will be news to half the world that the Russian nobles are sedulous collectors of books and manuscripts. Prince Woronzoff, for instance, has a library of 12,000 volumes in St. Petersburg, and possesses another equally large at Alupka. The Princess Lunog's library contains nearly 13,000 books, most of which were collected by her father, Bibikoff. In Slavonic literature it is especially rich, and it contains about 600 works in various languages on numismatics. The late Minister of Justice, Count Panin, had a library of 11,000 volumes, which was remarkable for an encyclopedic series of works relating to the legislation of the different European States. He had also considerable libraries in the Crimea and at Marsino, near Moscow. The library of Count Scheremetjeff, the foundations of which were laid by the conquerer of Livonia, contains 25,000 volumes, many incunobula, and a perfect treasury of ecclesiastical music. The present owner has himself increased his great literary heritage by the addition of nearly 12,000 volumes. He has been a diligent collector of books bearing upon Russian and Slavonic history and topography.—*Pall Mall Gazette.*

Destruction of Stand-Pipes.—About a year ago (January 7, 1887) an account was given of the destruction of a stand-pipe by an upward thrust due to a faulty design in building a stand-pipe larger at the base than throughout the main shaft. Two stand-pipes have recently burst in America which, although in different cities, by a strange coincidence belonged to the same man and burst on the same day within an hour of each other. In one instance the structure was a steel cylinder one hundred and thirty feet high, thirty feet in diameter, containing 630,000 United States gallons, and made of boiler-plate five-eighths of an inch at the base and one-fourth of an inch at the top. It was placed upon a stone masonry platform made of three courses of rubble masonry placed on cement. The structure was not provided with any braces, guys, or anchorage. The bottom plate was perforated with a twelve-inch orifice to receive the pipe which served as inlet and outlet. The total load on the foundations of the stand-pipe, when it was filled with water, was 552,500 pounds, amounting to a pressure of 7800 pounds per square foot on the foundation. It has been computed that the tensile stress per square inch of net section on the lower plates amounted to 25,000 pounds. As is usual in such instances, it is not known what was the exact cause accomplishing the destruction of the stand-pipe, but as water had been flowing from the top of the pipe a short time before this, it is probable that the foundation was somewhat disturbed by the water flowing over it and in that manner there was produced an unequal distribution of stress. In the other instance the tank was forty feet in diameter and thirty-five feet in height. The static head on the water-work system furnished by this tank, which was situated on a hill, being insufficient, it was raised forty feet and two circular brick walls constructed underneath it, the outer one being thirty-six feet in diameter and the inner one being twelve feet in diameter. These walls were sixteen inches thick at the top and three feet thick at the bottom, and were further strengthened by buttresses; the tank was also secured by wire guys made of wire rope. The water was supplied to or withdrawn from the stand-pipe through a single pipe entering at the bottom, but neither that nor the foundations appeared to have been disturbed in a manner connecting them in any way with the cause of the accident. A reservoir of water in Arkansas lately burst just two hours before the formal dedication of the new works, discharging more than 10,000,000 gallons of water over the ground which would have been occupied by a large concourse of people a short time later. The wall was built of stone laid in cement, being twelve feet six inches thick at the bottom, six feet thick at the top, and thirty-five feet in height. It is apparent that all these cases which have resulted in the destruction of property, in interference with all conveniences pertaining to public water-supply, safety against fire, and in great risk of danger to life, were caused by a lack of sufficient material to give sufficient stability to the structures. The accidents would certainly have been obviated by an employment of competent engineering services.—*Engineering.*

TRADE SURVEYS

The outcome of the utilization of natural-gas up to the present time has been the inventing of a number of systems for the manufacturing of artificial fuel. Manufacturers everywhere are giving more or less attention to the question of artificial fuel, and in hundreds of establishments the change has been successfully made. It has been estimated that artificial fuel is now used in establishments employing upward of 300,000 hands. Almost every day new shops and factories are adopting one of the many new methods upon the market. At the present rate of progress raw fuel will, in a comparatively few years, be confined to a very small number of steam-users. There are some thirty or forty systems now in use more or less. There are perhaps almost as many new systems under trial. Inventors, mechanics, engineers and others are devoting themselves with zeal to a more practical solution of this problem. The statistics published in engineering and special journals from week to week throw a great deal of light upon the progress that is being made. Even in the very best systems objections and defects are discovered which engineers are endeavoring to remove as rapidly as possible. Manufacturing enterprises in natural-gas localities are stimulated to effort by the probability, or, as some put it, the possibility of natural-gas giving out. Opinions differ as to this probability, and the question is about evenly balanced. One school asserts that natural-gas is constantly generated, and that the supply is unlimited and always will continue. The other school asserts the contrary. The gas-consuming public is informed that the supply is limited. and already numerous indications are given of coming exhaustion. The fact that natural-gas is discovered in widely separated localities does not lend much strength to the assertion that the supply is inexhaustible. The effect of the discovery of natural-gas has been the stimulating of the efforts to discover a substitute. The history of these efforts is very interesting. In time a new system will be introduced which will easily drive out raw fuel. The price of natural-gas is steadily advancing, and it is now almost equal to coal. The consumers of gas prefer it because of its cleanliness and the ease with which it is used. The manufacturers look at it simply from an economic standpoint. In some localities manufacturers have already gone back to coal. It is evident that natural-gas will not meet the requirements of those who live outside of its belt. The carrying of this fuel long distances is not favorably looked upon by capitalists, although one or two experiments made have proven satisfactory to the parties immediately concerned. Gas-engineers are authority for the statement that an industrial revolution in this respect is assured. Competition will drive the unwilling to the adoption of new methods. The cost of coal-mining has been reduced to perhaps the lowest possible point at the present prices of labor. Coal-cutting machinery is not found possible for general adoption. Freight rates cannot be reduced below the rates now ruling. Hence raw coal will not decline much below its present quotations. At no time has engineering and inventive enterprise been so thoroughly aroused to our urgent requirements for a new and cheap fuel as at this time. Manufacturers are preparing for a change as though they thought the exhaustion of the natural-gas supply was only a question of time. Engineers assert that artificial fuel can be made cheaper than natural gas. And they have the arguments and the figures on their side. Side by side with this progress comes the utilization of electricity as a motor, and the highest authorities among the electrical engineers assert that it is only a question of time for the successful establishment of electricity as the motive power with competition with steam no matter how cheaply the cost of the steam-raising may be made. The enthusiasts in this new enterprise may be excused for their confidence and the assurance with which they unreservedly give them. Their calculations and experiments entitle them to our consideration. Schemes for economic steam-raising power almost of a chimerical nature are now receiving indorsements from engineers and attention from the capitalists. Out of all this is sure to come radical improvements which will revolutionize the existing methods, and result in economies which are not possible with the present steam-raising methods.

Trade and manufacturing conditions continue slowly to improve. Financial authorities are somewhat disappointed at the unusual conservatism prevailing among borrowers and promoters of enterprises. There is no apparent scarcity of money, but many persons of a looking-into-the-future cast of mind have apprehensions of certain influences which will in the course of a year or two affect the business interests of the country with a great stringency. The basis for these predictions is that pursuits of all kinds, from farm to shop, are obliged to render more service now for a dollar than two, three or eight years ago. It will be time enough to take note of these prophecies and the influences referred to when they actually show themselves on the surface. At present the country is not suffering from any stringency. The banks are well supplied. The rate of interest is low where returns are sure. New enterprises are not held back where they recommend themselves to the judgment of good business men. Wages are not declining with reference to the purchasing power of money. Building has not been held back. Builders have not been discouraged. New works are projected with as much confidence as ever.

It is probable that the favorable commercial condition of former years will remain with us. As evidence of this fact it is to be noted that the gross earnings of 108 railroads for the past seven months show an increase on nearly $700,000 over the gross earning of same time last year. There is, of course, a great deal of unrest in financial and railroad circles over the inability of the Western railroad managers to come to terms and advance freight rates. The shippers are not concerned and would prefer to see the present disagreement perpetual. Building throughout the West shows very little falling off. So far as opinions and purposes in reference to next year have been expressed building will be undertaken on fully as large a scale as last spring. Building enterprise has been in nowise discouraged. All kinds of material continues low. There is a demand for houses in all the larger cities and in the country, particularly in small towns along railroads North and South beyond the Alleghanies. The iron trade maintains the strength which it manifested early in the month. Crude iron production has increased between six and seven thousand tons per day in three months. The outflow of capital Southward still continues. Southern cotton mills are paying excellent margins. New industrial establishments are multiplying and real estate sells at a low rate to investors. The manufacturers of machinery throughout the machine-manufacturing States of the North are at this time loaded up with about three months' work. There are indications that ship-building will increase very largely to supply the demand for vessels to ply between Northern Atlantic ports and the South American and Pacific coasts. A large amount of work is in sight. Companies are particularly formed to invest money very largely in this direction. Capitalists see excellent opportunities for safe investments in providing vessels for the exchange of commodities between the various ports of our own country and those of Central and South America. A large amount of lake tonnage has been determined upon for next year's construction. What we have lost in railroad building will be made up in other directions. Investors are encouraged to pursue enterprises. The cost of labor is in such a favorable condition and the cost of material of all kinds will probably continue low and regular—the condition of prices which followed the markets through 1887. We hear of a great deal of projected work. Now that promoters can rely upon a uniform cost of production it is safe to presume that much work which was not undertaken this year will be undertaken next.

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